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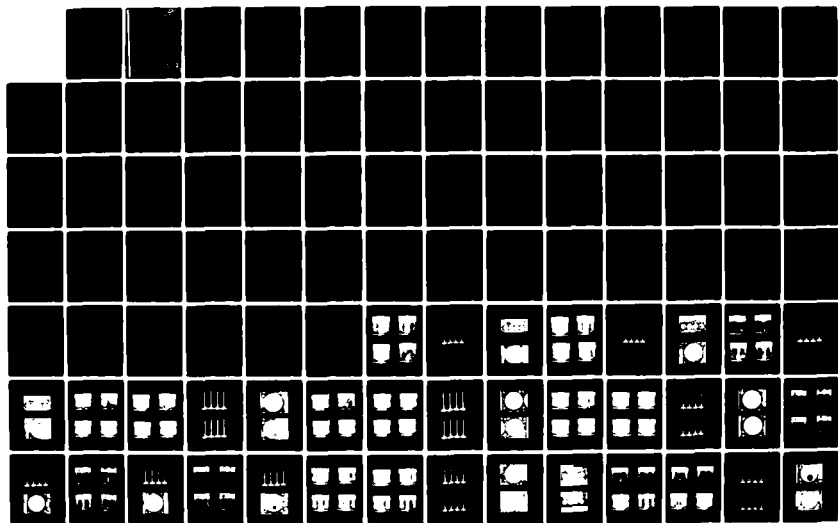
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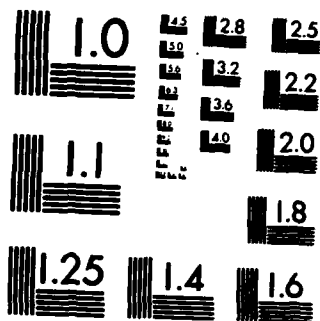
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**AFTER-TEST ENGINE INSPECTION
OF U.S. ARMY ADMINISTRATIVE
AND LIGHT-TACTICAL VEHICLES
OPERATED ON GASOHOL AND
UNLEADED GASOLINE**

AD A 137312

**INTERIM REPORT
AFLRL No. 167**

By

**W. E. Butler, Jr.
E. A. Frame
E. C. Owens**

**U.S. Army Fuels and Lubricants Research Laboratory
Southwest Research Institute
San Antonio, Texas**

Under Contract to

**U.S. Army Belvoir Research and Development Center
Materials, Fuels, and Lubricants Laboratory
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| <table border="0"> <tr> <td>Gasohol</td> <td>Unleaded Gasoline</td> <td>Varnish</td> </tr> <tr> <td>General-purpose Vehicles</td> <td>Light-Tactical Vehicles</td> <td>Sludge</td> </tr> <tr> <td>Spark-ignition Engine</td> <td>Engine Wear</td> <td>Engine Deposits</td> </tr> </table> | | | Gasohol | Unleaded Gasoline | Varnish | General-purpose Vehicles | Light-Tactical Vehicles | Sludge | Spark-ignition Engine | Engine Wear | Engine Deposits |
| Gasohol | Unleaded Gasoline | Varnish | | | | | | | | | |
| General-purpose Vehicles | Light-Tactical Vehicles | Sludge | | | | | | | | | |
| Spark-ignition Engine | Engine Wear | Engine Deposits | | | | | | | | | |
| 20. ABSTRACT (Continue on reverse side if necessary and identify by block number) | | | | | | | | | | | |
| <p>Eighteen spark ignition engines from U.S. Army administrative and light-tactical vehicles, which were part of a fleet test to determine the effects of operating such engines with gasohol as a fuel, were shipped to the U.S. Army Fuels and Lubricants Research Laboratory (USAFRLRL) for after-test inspections. Twelve of the engines were operated with gasohol as a fuel, and six of the engines were operated with unleaded gasoline. Each engine</p> | | | | | | | | | | | |

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20. ABSTRACT (Cont'd)

was disassembled for inspections which included visual inspection, wear measurements of selected components, deposit ratings in accordance with CRC rating methods, and photographs of selected parts. No significant differences between engines operated with gasohol and those operated with unleaded gasoline could be determined by any of the inspection methods used. Consideration of the data generated from the inspections support the conclusion that gasohol may be successfully utilized in the U.S. Army's administrative and light-tactical vehicles. ←

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TABLE OF CONTENTS

| <u>Section</u> | <u>Page</u> |
|----------------------------------|-------------|
| I. INTRODUCTION. | 5 |
| II. TEST EQUIPMENT. | 5 |
| A. Fuels. | 5 |
| B. Vehicles | 5 |
| III. TEST PROCEDURES | 7 |
| IV. DISCUSSION. | 7 |
| V. CONCLUSIONS | 20 |
| VI. LIST OF REFERENCES | 20 |
| APPENDICES | |
| A. Wear Measurements | 21 |
| B. Photographs | 59 |

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LIST OF TABLES

| <u>Table</u> | <u>Page</u> |
|--|-------------|
| 1 Description of Test Vehicles and Engines | 6 |
| 2 A Summary of Wear Measurement Data for Test Engines From Fort Belvoir, VA | 8 |
| 3 A Summary of Wear Measurement Data for Test Engines From Fort Lewis, WA | 9 |
| 4 A Summary of Wear Measurement Data for Test Engines From Fort McCoy, WI | 10 |
| 5 Percentage of Wear Measurements Outside Manufacturers' Specifications | 12 |
| 6 CRC Ratings for Test Engines From Fort Belvoir, VA | 13 |
| 7 CRC Ratings for Test Engines From Fort Lewis, WA | 14 |
| 8 CRC Ratings for Test Engines From Fort McCoy, WI | 15 |
| 9 Carburetor Ratings (Percent Area) for Fort Belvoir, VA | 16 |
| 10 Carburetor Ratings (Percent Area) for Fort Lewis, WA | 17 |
| 11 Carburetor Ratings (Percent Area) for Fort McCoy, WI | 18 |
| 12 CRC Weighted Deposit Ratings for Carburetor Lacquer Build-up | 19 |

I. INTRODUCTION

The eighteen engines received by the U.S. Army Fuels and Lubricants Research Laboratory (USAFLRL) for after-test inspections were removed from administrative and light-tactical vehicles which had been operated as part of a fleet test conducted for approximately one year by the U.S. Army Mobility Equipment Research and Development Command (USAMERADCOM) (Currently Belvoir Research and Development Center) to determine the suitability for using gasohol in all gasoline-consuming military vehicles.^{(1)*} Six engines each were shipped from Fort Belvoir, VA, Fort Lewis, WA, and Fort McCoy, WI for disassembly and inspection. Table 1 describes each engine received and, where possible, contains vehicle descriptions. The engines were enclosed in plastic wrappers and shipped in sealed containers lined with a plastic barrier material which adequately protected the engines.

II. TEST EQUIPMENT

A. Fuels

Two types of fuels were used in the fleet test. Gasohol, either commercially available or locally mixed, and commercially available unleaded gasoline which met specification VV-G-1690C. The locally mixed gasohol consisted of 10 vol% ethanol (197 minimum proof) and 90 vol% unleaded gasoline.⁽¹⁾ Two vehicles of each set of three were operated with the gasohol fuel, and the third vehicle of the set was operated using unleaded gasoline.

B. Vehicles

As shown in Table 1, the vehicles were a mix of commercial and light-tactical vehicles. The commercial vehicles from which engines were selected for after-test inspections were Ford station wagons and CJ5

*Underscored numbers in parentheses denote references listed at the end of the report.

TABLE 1. DESCRIPTION OF TEST VEHICLES AND ENGINES

| Installation | Unit | Vehicle Type | Bumper Number | Make | Engine | | SN | Fuel |
|-----------------|----------------|--------------|---------------|----------|--------|-------|----------|-------------------|
| | | | | | Type | CID | | |
| Ft. Belvoir, VA | 30th Engr. Bn. | M151A2 | SVY-10 | Johnson | 4 cyl. | 141.5 | 5001675 | Unleaded Gasoline |
| Ft. Belvoir, VA | 11th Engr. Bn. | M151A2 | HQ-32 | Johnson | 4 cyl. | 141.5 | 6003049 | Gasohol |
| Ft. Belvoir, VA | 30th Engr. Bn. | M151A2 | HQ-6 | Johnson | 4 cyl. | 141.5 | 500283 | Gasohol |
| Ft. Belvoir, VA | 30th Engr. Bn. | M890 | HQ-90 | Chrysler | V-8 | 318 | 03223146 | Unleaded Gasoline |
| Ft. Belvoir, VA | 11th Engr. Bn. | M880 | A-4 | Chrysler | V-8 | 318 | 07121303 | Gasohol |
| Ft. Belvoir, VA | 11th Engr. Bn. | M880 | SPED-214 | Chrysler | V-8 | 318 | 07090311 | Gasohol |
| Ft. Lewis, WA | 9th MP Co. | M151A2 | UNK* | Ford | 4 cyl. | 141.5 | 235880 | Unleaded Gasoline |
| Ft. Lewis, WA | 9th MP Co. | M151A2 | X-28 | Ford | 4 cyl. | 141.5 | 251891 | Gasohol |
| Ft. Lewis, WA | 9th MP Co. | M151A2 | X-29 | Ford | 4 cyl. | 141.5 | 235875 | Gasohol |
| Ft. Lewis, WA | 9th Med. Bn. | M880 | UNK | Dodge | V-8 | 318 | 01212997 | Unleaded Gasoline |
| Ft. Lewis, WA | 9th Med. Bn. | M880 | UNK | Dodge | V-8 | 318 | 02260516 | Gasohol |
| Ft. Lewis, WA | 9th Med. Bn. | M880 | UNK | Dodge | V-8 | 318 | 12110971 | Gasohol |
| Ft. McCoy, WI | UNK | CJ5 Jeep | HQ-192 | AMC | 6 cyl. | 232 | CD0941** | Unleaded Gasoline |
| Ft. McCoy, WI | UNK | CJ5 Jeep | HQ-195 | AMC | 6 cyl. | 232 | CD0935** | Gasohol |
| Ft. McCoy, WI | UNK | CJ5 Jeep | HQ-190 | AMC | 6 cyl. | 232 | CD0939** | Gasohol |
| Ft. McCoy, WI | UNK | Sta.Wagon | E-020 | Ford | V-8 | 400 | CD7099** | Unleaded Gasoline |
| Ft. McCoy, WI | UNK | Sta.Wagon | E-018 | Ford | V-8 | 400 | CD7097** | Gasohol |
| Ft. McCoy, WI | UNK | Sta.Wagon | E-019 | Ford | V-8 | 400 | CD7098** | Gasohol |

*UNK = Unknown

** = Serial numbers not on engines; vehicle numbers used instead

jeeps (1/4 ton, 4x4), while the light-tactical vehicles were in two configurations, pickups and M151A2 jeeps. The M880 series is a 5/4-ton pickup truck with 4-wheel drive. The M890 is a 5/4-ton pickup truck with a two-wheel drive. The M151A2 is a 1/4-ton vehicle with four-wheel drive.

III. TEST PROCEDURES

Test and control vehicles were to be operated for 1 year in order to experience a full cycle of seasonal changes. The location of test sites selected by MERADCOM ensured a wide range of climatic conditions in which the performance of the test and control vehicles might be evaluated. Vehicle operational data and performance problems are reported in Reference 1. The test and control vehicles were operated in accordance with normal mission requirements.

IV. DISCUSSION

The test and control engines were evaluated by (1) disassembly and visual inspections to determine if there were any signs of abnormal conditions or wear, (2) wear measurements of selected parts for comparison with manufacturers' specifications, (3) deposit ratings in accordance with CRC rating methods for both the engines and carburetors, and (4) photographs of selected engine components. Appendix A gives the wear measurements for each component measured. Tables 2, 3, and 4 show the summaries of wear measurements taken for each engine and show which wear measurements were outside the wear limits established by each manufacturer for a specific engine. The highest levels of wear appeared to be in the compression ring gaps for all vehicles and the camshaft lobe lift in the Ford and Chrysler V-8 engines. While main-bearing journals and connecting rod journals in the V-8 engines showed some wear, none could be specifically attributable to the type fuel used since the wear appeared to be the same for each engine in a given set of test and control engines. Valve spring force was another area in which a large number of

TABLE 2. A SUMMARY OF WEAR MEASUREMENT DATA FOR TEST ENGINES
FROM FT. BELVOIR, VA¹

| Type Engine | Chrysler V-8, 318 CID | | | | M151A2 Jeep, 6 Cylinder, 140 CID | | | |
|--|------------------------------|--------------------|--------------------|--|----------------------------------|--------------------|--------------------|--|
| Vehicle Serial Number | 07121303 | 07090311 | 03223146 | | 500283 | 5003049 | 5001675 | |
| AFLAL Number | 1 | 3 | 2 | Manufacturer's Unleaded Specifications Service Limits | 6 | 5 | 4 | Manufacturer's Unleaded Specifications Service Limits |
| Type Fuel | Gasohol | Gasohol | Gasoline | | Gasohol | Gasohol | Gasoline | |
| Components | | | | | | | | |
| Compression Ring Gaps | | | | | | | | |
| Top | 0.029 (0.74) | 0.030 (0.76) | 0.029 (0.74) | 0.010-0.020 (0.25)-(0.51) | 0.023 (0.58) | 0.039 (0.99) | 0.033 (0.84) | 0.010-0.027 (0.25)-(0.69) |
| Bottom | 0.033 (0.84) | 0.031 (0.79) | 0.027 (0.69) | | 0.027 (0.69) | 0.045 (1.14) | 0.032 (0.81) | |
| Cylinder Bore Diameter | | | | | | | | |
| Top | 3.9118 (99.360) | 3.9112 (99.344) | 3.9117 (99.357) | 3.9100-3.9120 (99.314)-(99.365) | 3.8763 (98.458) | 3.8786 (98.516) | 3.8768 (98.471) | 3.8753-3.8777 (98.433)-(98.494) |
| Middle | 3.9113 (99.347) | 3.9107 (99.332) | 3.9112 (99.344) | — | 3.8761 (98.453) | 3.8781 (98.504) | 3.8766 (98.466) | |
| Bottom | 3.9112 (99.344) | 3.9108 (99.334) | 3.9113 (99.347) | — | 3.8763 (98.458) | 3.8783 (98.509) | 3.8766 (98.466) | |
| Cylinder Bore Out-of-Round | | | | | | | | |
| Top | 0.0005 (0.013) | 0.0005 (0.013) | 0.0008 (0.020) | 0.0050 max (0.127) | 0.0002 (0.005) | 0.0005 (0.013) | 0.0005 (0.013) | 0.005 max (0.13) |
| Middle | 0.0006 (0.015) | 0.0009 (0.023) | 0.0007 (0.018) | — | 0.0004 (0.010) | 0.0005 (0.013) | 0.0003 (0.008) | — |
| Bottom | 0.0005 (0.013) | 0.0005 (0.013) | 0.0004 (0.010) | — | 0.0004 (0.010) | 0.0003 (0.008) | 0.0002 (0.005) | — |
| Taper of Cylinder Bore | | | | | | | | |
| | 0.0006 (0.015) | 0.0006 (0.015) | 0.0005 (0.013) | 0.010 max (0.25) | 0.0003 (0.008) | 0.0003 (0.008) | 0.0002 (0.005) | 0.008 max (0.20) |
| Main Bearings | | | | | | | | |
| Journal Diameter | 2.4996 (63.490) | 2.4994 (63.485) | 2.4998 (63.495) | 2.4995-2.5005 (63.487)-(63.513) | 2.2484 (57.109) | 2.2484 (57.109) | 2.2483 (57.107) | 2.2482-2.2490 (57.104)-(57.125) |
| Shell Diameter | 2.5027 (63.569) | 2.5029 (63.574) | 2.5022 (63.556) | 2.5000-2.5030 (63.500)-(63.576) | 2.2511 (57.178) | 2.2514 (57.186) | 2.2526 (57.216) | 2.2494-2.2512 (57.135)-(57.180) |
| Connecting Rod Bearings | | | | | | | | |
| Journal Diameter | 2.1239 (53.947) | 2.1237 (53.942) | 2.1235 (53.937) | 2.1240-2.1250 (53.950)-(53.975) | 1.9986 (50.764) | 1.9985 (50.762) | 1.9987 (50.767) | 1.9982-1.9990 (50.754)-(50.775) |
| Shell Diameter | 2.1262 (54.005) | 2.1267 (54.018) | 2.1265 (54.013) | 2.1245-2.1275 (53.962)-(54.039) | 2.0005 (50.813) | 2.0008 (50.820) | 1.9998 (50.795) | 1.9992-2.0010 (50.780)-(50.825) |
| Piston Average Diameters (Middle and Bottom of Skirt) | | | | | | | | |
| | 3.9089 (99.286) | 3.9089 (99.286) | 3.9096 (99.304) | 3.9085-3.9115 (99.276)-(99.3521) | 3.8735 (98.387) | 3.8745 (98.412) | 3.8736 (98.389) | 3.8741-3.8765 (98.402)-(98.463) |
| Valve Stem to Guide Clearance | | | | | | | | |
| Intake | 0.0023 (0.058) | 0.0023 (0.058) | 0.0024 (0.061) | 0.001-0.017 (0.03)-(0.43) | 0.0027 (0.069) | 0.0027 (0.069) | 0.0056 (0.140) | 0.0010-0.0025 (0.025)-(0.064) |
| Exhaust | 0.0023 (0.058) | 0.0024 (0.061) | 0.0024 (0.061) | | 0.0031 (0.079) | 0.0027 (0.069) | 0.0051 (0.130) | 0.0010-0.0035 (0.025)-(0.089) |
| Valve Spring Force | | | | | | | | |
| Intake | 80 (356) | 80 (356) | 78 (347) | 78-88 @ 1-11/16" (347)-(391) @ 42.86mm | 110 (489) | 107 (476) | 108 (480) | 132 lb @ 1.505" (587)(N-m) @ (38.23 mm) |
| Exhaust | 80 (356) | 79 (351) | 78 (347) | | 110 (489) | 109 (485) | 109 (485) | Wear Limit-110 lbs |
| Camshaft Lobe Lift | | | | | | | | |
| Intake | 0.236 ² (5.99) | 0.240 (6.10) | 0.240 (6.10) | 0.243-0.249 ³ (6.17)-(6.32) | 0.240 (6.10) | 0.232 (5.89) | 0.231 (5.87) | 0.2369-0.2419 (6.017)-(6.144) |
| Exhaust | 0.252 (6.40) | 0.256 (6.35) | 0.258 (6.35) | 0.260-0.267 (6.60)-(6.78) | 0.233 (5.92) | 0.230 (5.84) | 0.225 (5.72) | 0.2330-0.2380 (5.918)-(6.043) |

- All measurements are averages expressed in inches and (mm) except Valve Spring Force [lb and (N-m)].
- Camshaft lobe lift was computed using the valve lift in inches given by the manufacturer, multiplied by the ratio (111.3) determined by the distance traveled by the rocker arm (1 1/2") when acted upon by the push rod rising one inch.
- Wear limits were determined statistically by using the mean and standard deviation of the mean for intake and exhaust valve wear measurements respectively and using the formula: Range of U = $\bar{x} \pm (s/\sqrt{n})(t)$ where U = population mean, \bar{x} = sample mean, s = standard deviation of the mean, n = sample population elements, and t = the value from the t tables for a 95 percent certainty level.

**TABLE 3. A SUMMARY WEAR MEASUREMENT DATA FOR TEST ENGINES
FROM FT. LEWIS, WA¹**

| Type Engine Serial Number AFRL Number | Chrysler V-8, 318 CID | | | | M151A2 Jeep, 4 Cylinder, 140 CID | | | |
|--|------------------------------|--------------------|--------------------|--|----------------------------------|---------------------------------|---------------------------------|--|
| | 02260516 11 | 12110971 12 | 01212997 10 | Manufacturer's Specifications Service Limits | 251891 7 | 235875 9 | 235880 8 | Manufacturer's Specifications Service Limits |
| Type Fuel | Gasohol | Gasohol | Gasoline | | Gasohol | Gasohol | Gasoline | |
| <u>Components</u> | | | | | | | | |
| <u>Compression Ring Gaps</u> | | | | | | | | |
| Top | 0.030 ² (0.76) | 0.034 (0.86) | 0.028 (0.71) | 0.010-0.020 (0.25)-(0.51) | 0.051 (1.30) | 0.054 (1.37) | 0.052 (1.32) | 0.010-0.027 (0.25)-(0.69) |
| Bottom | 0.032 ² (0.81) | 0.034 (0.86) | 0.028 (0.71) | | 0.070 (1.78) | 0.069 (1.75) | 0.072 (1.83) | |
| <u>Cylinder Bore Diameter</u> | | | | | | | | |
| Top | 3.9115 (99.352) | 3.9120 (99.365) | 3.9108 (99.334) | 3.9100-3.9120 (99.314)-(99.365) | 3.8778 (98.496) | 3.8776 (98.491) | 3.8786 (98.516) | 3.8753-3.8777 (98.433)-(98.494) |
| Middle | 3.9112 (99.344) | 3.9121 (99.367) | 3.9105 (99.317) | | 3.8769 (98.473) | 3.8770 (98.476) | 3.8780 (98.501) | |
| Bottom | 3.9112 (99.304) | 3.9119 (99.362) | 3.9104 (99.324) | | 3.8770 (98.476) | 3.8763 (98.458) | 3.8770 (98.476) | |
| <u>Cylinder Bore Out-of-Round</u> | | | | | | | | |
| Top | 0.0007 (0.018) | 0.0005 (0.013) | 0.0006 (0.015) | 0.0050 max (0.127) | 0.0007 (0.018) | 0.0011 (0.028) | 0.0015 (0.038) | 0.005 (0.13) max |
| Middle | 0.0010 (0.025) | 0.0006 (0.015) | 0.0005 (0.013) | | 0.0002 (0.005) | 0.0004 (0.010) | 0.0004 (0.010) | |
| Bottom | 0.0004 (0.010) | 0.0004 (0.010) | 0.0004 (0.010) | | 0.0003 (0.008) | 0.0004 (0.010) | 0.0006 (0.015) | |
| <u>Taper of Cylinder Bore</u> | | | | | | | | |
| | 0.0006 (0.015) | 0.0003 (0.008) | 0.0004 (0.010) | 0.010 max (0.25) | 0.0008 (0.020) | 0.0013 (0.033) | 0.0016 (0.041) | 0.008 (0.20) max |
| <u>Main Bearings</u> | | | | | | | | |
| Journal Diameter | 2.4998 (63.495) | 2.4997 (63.492) | 2.4995 (63.487) | 2.4995-2.5005 (63.487)-(63.513) | 2.2485 (57.112) | 2.2483 (57.107) | 2.2484 (57.109) | 2.2482-2.2490 (57.104)-(57.125) |
| Shell Diameter | 2.5022 (63.556) | 2.5021 (63.553) | 2.5026 (63.566) | 2.5000-2.5030 (63.500)-(63.576) | 2.2527 (57.219) | 2.2527 (57.219) | 2.2523 (57.208) | 2.2494-2.2512 (57.135)-(57.180) |
| <u>Connecting Rod Bearings</u> | | | | | | | | |
| Journal Diameter | 2.1238 (53.945) | 2.1242 (53.955) | 2.1242 (53.955) | 2.1240-2.1250 (53.950)-(53.975) | 1.9987 (50.767) | 1.9982 (50.754) | 1.9987 (50.767) | 1.9982-1.9990 (50.754)-(50.775) |
| Shell Diameter | 2.1265 (54.013) | 2.1265 (54.013) | 2.1259 (53.998) | 2.1245-2.1275 (53.962)-(54.039) | 2.0016 ³ (50.841) | 2.0020 ³ (50.851) | 2.0020 ³ (50.851) | 1.9992-2.0010 (50.780)-(50.825) |
| <u>Piston Average Diameters (Middle and Bottom of Skirt)</u> | | | | | | | | |
| | 3.9074 (99.248) | 3.9092 (99.294) | 3.9095 (99.301) | 3.9085-3.9115 (99.276)-(99.351) | 3.8735 (98.387) | 3.8730 (98.374) | 3.8739 (98.397) | 3.8741-3.8765 (98.402)-(98.463) |
| <u>Valve Stem to Guide Clearance</u> | | | | | | | | |
| Intake | 0.0056 (0.142) | 0.0066 (0.168) | 0.0055 (0.140) | 0.001-0.017 (0.03)-(0.43) | 0.0059 (0.150) | 0.0067 (0.170) | 0.0053 (0.135) | 0.0010-0.0025 (0.025)-(0.064) |
| Exhaust | 0.0065 (0.165) | 0.0078 (0.198) | 0.0073 (0.185) | | 0.0049 (0.124) | 0.0085 (0.216) | 0.0059 (0.150) | 0.0020-0.0035 (0.051)-(0.089) |
| <u>Valve Spring Force</u> | | | | | | | | |
| Intake | 164 (730) | 157 (698) | 158 (703) | 170 lb @ 1 5/16 in. (347) (N-m) @ | 107 (476) | 105 (476) | 108 (480) | 132 lb @ 1.505 in. (587) (N-m) @ 38.23 mm |
| Exhaust | 116 (516) | 111 (494) | 112 (498) | 42.86 mm | 107 (476) | 104 (463) | 107 (476) | Wear Limit-110 lbs |
| <u>Camshaft Lobe Lift</u> | | | | | | | | |
| Intake | 0.239 (6.07) | 0.238 (6.05) | 0.238 (6.05) | 0.243-0.249 ⁴ (6.17)-(6.32) | 0.242 (6.15) | 0.238 (6.05) | 0.225 (5.20) | 0.2369-0.2419 (6.017)-(6.144) |
| Exhaust | 0.254 (6.45) | 0.252 (6.40) | 0.260 (6.60) | 0.269-0.267 (6.60)-(6.78) | 0.235 (5.97) | 0.233 (5.92) | 0.234 (5.94) | 0.2330-0.2380 (5.918)-(6.045) |

1. All measurements are averages expressed in inches and (mm) except Valve Spring Force [lb and (N-m)].
2. Piston No. 6 compression rings broken.
3. All rod bearings worn through to copper plating.
4. See Note 3, Table 2.

TABLE 4. A SUMMARY OF WEAR MEASUREMENT DATA FOR TEST ENGINES
FROM FT. MCCOY, WI¹

| Type Engine | Ford V-8, 400 CID | | | | CJ5 Jeep AMC, 6 Cylinder, 232 CID | | | |
|--|---------------------|---------------------|---------------------|--|-----------------------------------|--------------------|--------------------|---|
| Vehicle Serial Number | CD7097 | CD7098 | CD7099 | Manufacturer's | CD0939 | CD0935 | CD0941 | Manufacturer's |
| AFRL Number | 13 | 14 | 15 | Specifications | 16 | 18 | 17 | Specifications |
| Type Fuel | Gasohol | Gasohol | Gasoline | Service Limits | Gasohol | Gasohol | Gasoline | Service Limits |
| Components | | | | | | | | |
| Compression Ring Gaps | | | | | | | | |
| Top | 0.029 (0.74) | 0.034 (0.86) | 0.033 (0.84) | 0.010-0.020 (0.25)-(0.51) | 0.027 (0.69) | 0.029 (0.74) | 0.028 (0.71) | 0.010-0.020 (0.25)-(0.51) |
| Bottom | 0.040 (1.02) | 0.056 (1.42) | 0.039 (0.99) | 0.010-0.020 (0.25)-(0.51) | 0.035 (0.89) | 0.033 (0.84) | 0.034 (0.86) | 0.010-0.020 (0.25)-(0.51) |
| Cylinder Bore Diameter | | | | | | | | |
| Top | 4.0037 (101.694) | 4.0039 (101.699) | 4.0041 (101.704) | 4.000-4.0048 (101.600)-(101.722) | 3.7541 (95.354) | 3.7520 (95.301) | 3.7517 (95.293) | 3.7501-3.7533 (95.253)-(95.334) |
| Middle | 4.0030 (101.676) | 4.0031 (101.679) | 4.0032 (101.681) | -- | 3.7519 (95.298) | 3.7515 (95.288) | 3.7511 (95.278) | -- |
| Bottom | 4.0031 (101.679) | 4.0032 (101.681) | 4.0032 (101.681) | -- | 3.7520 (95.301) | 3.7517 (95.293) | 3.7512 (95.280) | -- |
| Cylinder Bore Out-of-Round | | | | | | | | |
| Top | 0.0008 (0.020) | 0.0003 (0.008) | 0.0006 (0.015) | 0.0015 max (0.038) | 0.0007 (0.018) | 0.0006 (0.015) | 0.0006 (0.015) | 0.003 (0.08) |
| Middle | 0.0011 (0.028) | 0.0004 (0.010) | 0.0010 (0.025) | -- | 0.0003 (0.008) | 0.0004 (0.010) | 0.0003 (0.008) | max |
| Bottom | 0.0008 (0.020) | 0.0006 (0.015) | 0.0007 (0.018) | -- | 0.0002 (0.005) | 0.0001 (0.003) | 0.0003 (0.008) | -- |
| Taper of Cylinder Bore | | | | | | | | |
| | 0.0007 (0.018) | 0.0007 (0.018) | 0.0009 (0.023) | 0.010 max (0.25) | 0.0021 (0.053) | 0.0006 (0.015) | 0.0006 (0.015) | 0.005 max (0.13) |
| Main Bearings | | | | | | | | |
| Journal Diameter | 2.9991 (76.177) | 2.9898 (75.941) | 2.9993 (76.182) | 2.9994-3.0002 (76.185)-(76.205) | 2.4989 (63.472) | 2.4989 (63.472) | 2.4989 (63.472) | 2.4986-2.5001 (63.464)-(63.503) |
| Shell Diameter | 3.0036 (76.291) | 2.9954 (76.083) | 3.0019 (76.248) | 3.0002-3.0028 (76.205)-(76.271) | 2.5020 (63.551) | 2.5012 (63.530) | 2.5015 (63.538) | 2.4996-2.5021 (63.490)-(63.553) |
| Connecting Rod Bearings | | | | | | | | |
| Journal Diameter | 2.3104 (58.684) | 2.3107 (58.692) | 2.3101 (58.677) | 2.3103-2.3111 (58.682)-(58.702) | 2.0940 (53.188) | 2.0943 (53.195) | 2.0945 (53.200) | 2.0934-2.0955 (53.172)-(53.226) |
| Shell Diameter | 2.3120 (58.725) | 2.3124 (58.732) | 2.3129 (58.748) | 2.3111-2.3136 (58.702)-(58.765) | 2.0966 (53.254) | 2.0975 (53.277) | 2.0981 (53.292) | 2.0944-2.0975 (53.198)-(53.277) |
| Piston Average Diameters (Middle and Bottom of Skirt) | | | | | | | | |
| | 3.9994 (101.585) | 3.9997 (101.592) | 3.9997 (101.592) | Coded Blue 3.9994-4.0000 (101.585)-(101.600) | 3.7497 (95.242) | 3.7495 (95.237) | 3.7494 (95.235) | 3.7483-3.7491 (95.207)-(95.227) |
| Valve Stem to Guide Clearance | | | | | | | | |
| Intake | 0.0032 (0.081) | 0.0032 (0.081) | 0.0042 (0.107) | Service Clearance 0.005 (0.127) | 0.0023 (0.058) | 0.0021 (0.053) | 0.0027 (0.069) | 0.001-0.003 (0.03)-(0.08) |
| Exhaust | 0.0048 (0.122) | 0.0039 (0.099) | 0.0048 (0.122) | 0.005 (0.127) | 0.0026 (0.066) | 0.0030 (0.076) | 0.0030 (0.076) | 0.001-0.003 (0.03)-(0.08) |
| Valve Spring Force | | | | | | | | |
| Intake | 174.0 (774) | 71 (316) | 220.3 (980) | 76-84 @ 1.82 (338)-(374)@ (46.23) 215-237 @ 1.39 (956)-(1054)@ (35.31) | 88 (391) | 85 (378) | 81 (360) | 95-105 @ 1 13/16" (423)-(467)@ (46.04) |
| Exhaust | 177.4 (789) | 69 (307) | 219.4 (976) | 79-87 @ 1.68 (351)-(387)@ (42.67) 215-237 @ 1.39 (956)-(1054)@ (35.31) | 88 (391) | 87 (387) | 85 (378) | 95-105 @ 1 13/16" (423)-(467)@ (46.04) |
| Camshaft Lobe Lift | | | | | | | | |
| Intake | 0.188 (4.78) | 0.235 (5.97) | 0.233 (5.92) | 0.245-0.250 (6.22)-(6.35) | 0.230 (5.84) | 0.227 (5.77) | 0.228 (5.79) | 0.227-0.2320 (5.77)-(5.892) |
| Exhaust | 0.210 (5.33) | 0.231 (5.87) | 0.231 (5.87) | -- | 0.229 (5.82) | 0.219 (5.56) | 0.230 (5.84) | 0.227-0.2332 (5.77)-(5.923) |

Note:

All measurements are averages expressed in inches and (mm) except Valve Spring Force [lb and (N-m)].

measurements indicated variation from standards, particularly in the jeep, four-cylinder engines. The results could not be attributed to the fuels used, but appeared to have been affected by normal engine wear and local maintenance procedures and practices. Table 5 shows the percentage of wear measurements outside manufacturers' specifications. This table supports the general observation that there are no significant differences between the fuels used, although some slight differences exist between averages for different test sites.

Tables 6, 7, and 8 show the results of the CRC deposit ratings for each test and control vehicle. None of the engines showed any real distress whether gasohol or unleaded gasoline was used. The sludge merit ratings were very good for all engines, while varnish ratings ranged from fair to very good. All the engines in a particular set of three displayed similar results regardless of fuel used. The differences that existed were between test sites rather than fuels used. This could be attributed to the use of different lubricants at each test site or different operating conditions and maintenance procedures.

Tables 9, 10, and 11 show the results of CRC deposit ratings made for the carburetors. This rating system was a CRC demerit system which differs from the CRC ratings made for the engines. For the engines, a merit rating of 10 was best with 0 being the worst condition. For the carburetors, the demerit scale was used with 0 (no buildup) as the best rating and 10 as the worst situation. The percentage of area covered by a specific degree of lacquer buildup was multiplied by a weighting factor as explained in the footnotes for Table 12. While some differences can be noted, they are not attributable to the type of fuel used but again differ by test site.

Appendix B contains the photographs taken of selected areas and components for each test and control engine. The photographs reveal no significant differences between engines whether operated on gasohol or unleaded gasoline. They tend to support the ratings in Tables 6, 7, and 8. While some components of some engines are definitely cleaner than others, the same general trend of differences between test sites rather than fuels is consistent.

TABLE 5. PERCENTAGE OF WEAR MEASUREMENTS
OUTSIDE MANUFACTURERS' SPECIFICATIONS

| <u>Engine Type/Serial No.</u> | <u>No. Outside Mfg. Specs</u> | <u>No. of Elements per Veh.</u> | <u>% Outside Limits</u> | | <u>Station</u> |
|-------------------------------|-----------------------------------|---|-------------------------|------------------------------|----------------|
| | | | <u>Gasohol</u> | <u>Unleaded Gasoline</u> | |
| Chrysler V-8, 318 CID | | | | | |
| 07121303 | 5 | 16 | 31 | -- | Ft. Belvoir |
| 07090311 | 6 | 16 | 38 | -- | Ft. Belvoir |
| 03223146 | 5 | 16 | -- | 31 | Ft. Belvoir |
| 02260516 | 6 | 16 | 38 | -- | Ft. Lewis |
| 12110971 | 4 | 16 | 25 | -- | Ft. Lewis |
| 01212997 | 3 | 16 | -- | 19 | Ft. Lewis |
| | | Average | 33 | 25 | |
| Jeep, 4 Cylinder, 140 CID | | | | | |
| 500283 | 2 | 16 | 13 | -- | Ft. Belvoir |
| 5003049 | 9 | 16 | 56 | -- | Ft. Belvoir |
| 5001675 | 10 | 16 | -- | 63 | Ft. Belvoir |
| 251891 | 9 | 16 | 56 | -- | Ft. Lewis |
| 235875 | 9 | 16 | 56 | -- | Ft. Lewis |
| 235880 | 11 | 16 | -- | 69 | Ft. Lewis |
| | | Average | 45 | 66 | |
| Ford V-8, 400 CID | | | | | |
| CD7097 | 8 | 16 | 50 | -- | Ft. McCoy |
| CD7098 | 8 | 16 | 50 | -- | Ft. McCoy |
| CD7099 | 6 | 16 | -- | 38 | Ft. McCoy |
| | | Average | 50 | 38 | |
| AMC, 6 Cylinder, 232 CID | | | | | |
| CD0939 | 5 | 16 | 31 | -- | Ft. McCoy |
| CD0935 | 6 | 16 | 38 | -- | Ft. McCoy |
| CD0941 | 6 | 16 | -- | 38 | Ft. McCoy |
| | | Average | 35 | 38 | |
| Overall Average | | | 41 | 42 | |

TABLE 6. CRC RATINGS FOR TEST ENGINES
FROM FT. BELVOIR, VA

| Type Engine | Chrysler V-8, 318 CID | | | Jeep, 4 Cylinder, 140 CID | | |
|------------------------------|-----------------------|----------|-------------------|---------------------------|---------|-------------------|
| Serial Number | 07121303 | 07090311 | 03223146 | 500283 | 5003049 | 5001675 |
| AFLRL Number | 1 | 3 | 2 | 6 | 5 | 4 |
| Type Fuel | Gasohol | Gasohol | Unleaded Gasoline | Gasohol | Gasohol | Unleaded Gasoline |
| <u>Sludge Merit Ratings*</u> | | | | | | |
| Left Rocker Arm Cover | 8.40 | 7.18 | 8.30 | | | |
| Right Rocker Arm Cover | 8.25 | 7.34 | 8.65 | | | |
| Rocker Arm Cover | | | | 9.30 | 8.40 | 9.75 |
| Underside of Intake Manifold | 9.00 | 6.20 | 8.88 | | | |
| Front Seal Housing | | | | 9.75 | 9.15 | 9.75 |
| Oil Pan | 8.97 | 8.30 | 8.80 | 9.25 | 9.05 | 9.22 |
| Left Valve Deck | 7.90 | 7.30 | 9.00 | | | |
| Right Valve Deck | 7.70 | 6.35 | 9.00 | | | |
| Valve Deck | | | | 9.75 | 9.00 | 9.75 |
| Underside of Block | | | | 9.75 | 9.00 | 9.75 |
| Pushrod Chamber | ** | 7.90 | 7.80 | | | |
| Timing Gear Cover | 9.00 | 8.30 | 9.15 | | | |
| Average | 8.46 | 7.36 | 8.70 | 9.56 | 8.92 | 9.64 |
| <u>Varnish Ratings*</u> | | | | | | |
| Piston Skirts | 7.07 | 7.04 | 6.39 | 9.09 | 7.69 | 8.30 |
| Rocker Arm Covers | 5.75 | 3.08 | 6.18 | 7.68 | 6.43 | 6.40*** |
| Valve Lifter Bodies | 4.44 | 2.50 | 7.41 | | | |
| Valve Lifter Plungers | 9.75 | 10.00 | 10.00 | | | |
| Cylinder Walls | 6.36 | 6.14 | 6.98 | 8.06 | 8.09 | 9.80 |
| Oil Pan | 6.95 | 5.05 | 6.38 | 6.93 | 7.70 | 7.55 |
| Average | 6.72 | 5.64 | 7.22 | 7.94 | 7.48 | 8.01 |
| <u>Other Ratings</u> | | | | | | |
| Oil Screen % Clogging | 20 | 1.00 | <1 | <1 | 0.0 | 0.0 |
| Intake Valve Deposits* | 6.73 | 6.63 | 8.21 | 7.95 | 6.45 | 8.55 |
| Oil Rings, % Clogging | 5.00 | 1.00 | 1.00 | <1 | 1 | <1 |
| Pistons, % Scuffing (Avg) | 3.75 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Cylinder, % Scuffing | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

* 10 = most clean; 0 = least clean

** This part was rinsed with solvent before rating and could not be rated

*** Some of these deposits could be rust

TABLE 7. CRC RATINGS FOR TEST ENGINES
FROM FT. LEWIS, WA

| Type Engine | Chrysler V-8, 318 CID | | | Jeep, 4 Cylinder, 140 CID | | |
|------------------------------|-----------------------|----------|-------------------|---------------------------|---------|-------------------|
| Serial Number | 02260516 | 12110971 | 01212997 | 251891 | 235875 | 235880 |
| AFLRL Number | 11 | 12 | 10 | 7 | 9 | 8 |
| Type Fuel | Gasohol | Gasohol | Unleaded Gasoline | Gasohol | Gasohol | Unleaded Gasoline |
| <u>Sludge Merit Ratings*</u> | | | | | | |
| Left Rocker Arm Cover | 9.40 | 9.40 | 9.61 | | | |
| Right Rocker Arm Cover | 9.50 | 9.34 | 9.51 | | | |
| Rocker Arm Cover | | | | 9.75 | 9.29 | 7.50 |
| Underside of Intake Manifold | 9.62 | 9.63 | 9.48 | | | |
| Front Seal Housing | | | | 9.60 | 9.75 | 9.15 |
| Oil Pan | 9.26 | 9.23 | 7.32 | 9.50 | 9.47 | 9.40 |
| Left Valve Deck | 9.75 | 9.75 | 9.75 | | | |
| Right Valve Deck | 9.75 | 9.75 | 9.75 | | | |
| Valve Deck | | | | 9.75 | 9.75 | 9.50 |
| Underside of Block | | | | 9.75 | 9.75 | 9.50 |
| Pushrod Chamber | 9.50 | 9.75 | 8.84 | | | |
| Timing Gear Cover | 9.64 | 9.60 | 9.73 | | | |
| Average | 9.55 | 9.56 | 9.23 | 9.67 | 9.60 | 9.01 |
| <u>Varnish Ratings*</u> | | | | | | |
| Piston Skirts | 8.02 | 7.98 | 7.91 | 7.60** | 9.14 | 7.68 |
| Rocker Arm Covers | 7.76 | 7.65 | 7.65 | 7.85** | 4.88 | 5.03 |
| Valve Lifter Bodies | 6.31 | 8.98 | 6.45 | | | |
| Valve Lifter Plungers | 10.00 | 10.00 | 10.00 | | | |
| Cylinder Walls | 9.39 | 9.27 | 9.22 | 6.84 | 8.19 | 6.97 |
| Oil Pan | 7.70 | 7.40 | 7.55 | 6.85 | 7.00 | 7.78 |
| Average | 8.20 | 8.55 | 8.13 | 7.29 | 7.30 | 6.87 |
| <u>Other Ratings</u> | | | | | | |
| Oil Screen Clogging | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Intake Valve Deposits* | 7.74 | 8.56 | 7.09 | 6.93 | 7.10 | 6.93 |
| Oil Rings, % Clogging | 0.0 | 0.0 | 0.0 | 1 | 1 | 1 |
| Pistons, % Scuffing (Avg) | 10.6 | 0.0 | 5.0 | 0.0 | 0.0 | 0.0 |
| Cylinder, % Scuffing | No. 6-100 | | | | | |

* 10 = most clean; 0 = least clean

** Some of these deposits could be rust

TABLE 8. CRC RATINGS FOR TEST ENGINES
FROM FT. MCCOY, WI

| Type Engine | Ford V-8, 400 CID | | | AMC, 6-Cylinder, 232 CID | | |
|------------------------------|--------------------|-------------------|-------------------|--------------------------|---------|-------------------|
| Vehicle Serial Number | CD-7097 | CD-7098 | CD-7099 | CD-0935 | CD-0939 | CD-0941 |
| AFLRL Number | 13 | 14 | 15 | 18 | 16 | 17 |
| Type Fuel | Gasohol | Gasohol | Unleaded Gasoline | Gasohol | Gasohol | Unleaded Gasoline |
| <u>Sludge Merit Ratings*</u> | | | | | | |
| Left Rocker Arm Cover | 9.18 | 8.57 | 9.25 | | | |
| Right Rocker Arm Cover | 8.89 | 8.85 | 9.22 | | | |
| Rocker Arm Cover | | | | 9.75 | 5.75 | 9.65 |
| Underside of | | | | | | |
| Intake Manifold | 8.99 | 9.15 | 9.15 | | | |
| Oil Pan | 9.34 | 9.40 | 9.54 | 9.60 | 9.60 | 9.17 |
| Left Valve Deck | 5.35 | 9.40 | 9.75 | | | |
| Right Valve Deck | 7.38 | 9.40 | 9.75 | | | |
| Valve Deck | | | | 9.75 | 9.75 | 9.75 |
| Pushrod Chamber | 2.20 | 8.90 | 6.50 | | | |
| Timing Gear Cover | 9.60 | 9.00 | 9.40 | 9.65 | 9.75 | 9.67 |
| Average | 7.62 | 9.08 | 9.07 | 9.69 | 8.71 | 9.56 |
| <u>Varnish Ratings*</u> | | | | | | |
| Piston Skirts | 5.78 ⁺⁺ | 7.26 | 5.74 | 9.71 | 9.625 | 8.05 |
| Rocker Arm Covers | 6.65 [@] | 6.80 | 6.89 | 8.50 | 4.05 | 2.00 |
| Valve Lifter Bodies | 2.91 [@] | 2.80 [@] | 3.06 | 8.92 | 9.80 | 9.50 |
| Valve Lifter Plungers | 3.00 | 4.00 | 7.50 | 10.00 | 10.00 | 10.00 |
| Cylinder Walls | 4.67 | 5.26 | 4.69 | 8.29 | 7.9875 | 6.583 |
| Oil Pan | 5.23 | 6.08 | 5.50 | 6.48 | 6.975 | 3.675 |
| Timing Gear Cover | | | | 8.00 | 9.50 | 2.60 |
| Average | 4.71 | 5.37 | 5.56 | 8.56 | 8.28 | 6.06 |
| <u>Other Ratings</u> | | | | | | |
| Oil Screen % Clogging | 0.0 | 0.0 | 0.0 | <1 | 0.0 | <1 |
| Intake Valve Deposits* | 6.20 | 7.13 | 7.13 | 6.90 | 7.5 | 7.08 |
| Oil Rings, % Clogging | 1 | 1 | 1 | <1 | <1 | <1 |
| Pistons, % Scuffing (Avg) | +++ | +++ | +++ | + | 0.0 | ** |
| Cylinder, % Scuffing | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

* 10 = most clean; 0 = least clean

** Slight scuffing, pistons 2,3,5.

+ Slight scuffing, pistons 3,5

++ Sludge deposits had hardened; difficult to wipe off to rate for varnish (possibly engine had been sitting for a long period of time)

+++ Slight scuffing pistons 1 through 8; oil rings (installed?) with gaps lined up.

@ All lifters dished.

TABLE 9. CARBURETOR RATINGS (PERCENT AREA)
FOR FT. BELVOIR, VA

M151A2 Jeep, 4-Cylinder, 140 CID Engines

| AFLRL Carburetor Number | Top Plate | | | Top Venturi | | | Bottom Plate | | | Bottom Venturi | | | | | |
|-------------------------------|-----------|-----|----|-------------|-----|------|--------------|----|------|----------------|------|-----|----|------|----|
| | VLAL | LAL | AL | DBRL | BL* | VLAL | LAL | AL | DBRL | BL | VLAL | LAL | AL | DBRL | BL |
| 4*** | | | | 10 | 90 | | 5 | 5 | | | 25 | 20 | | 15 | 40 |
| 5** | 15 | | | | 85 | | 30 | 40 | 30 | 60 | 10 | | 5 | 60 | 25 |
| 6** | 10 | 60 | 30 | | | | | 10 | 90 | 40 | | 10 | 20 | 30 | 40 |

Chrysler V-8, 318 CID Engines

| AFRL Carburetor Number | Top Plate | | | Top Venturi | | | Bottom Plate | | | Bottom Venturi | | | | | | | |
|------------------------------|-----------|-----|----|-------------|----|------|--------------|----|------|----------------|------|-----|----|------|----|----|----|
| | VLAL | LAL | AL | DBRL | BL | VLAL | LAL | AL | DBRL | BL | VLAL | LAL | AL | DBRL | BL | | |
| 1** | 75 | 25 | | | | 25 | 35 | 20 | 20 | 50 | 20 | 25 | 5 | 10 | 10 | 30 | 40 |
| 2*** | | 20 | 50 | 30 | | | 10 | 20 | 70 | 95 | 5 | | | 20 | 30 | 30 | 20 |
| 3** | 10 | 10 | 10 | 10 | 70 | | | 5 | 95 | 90 | | 6 | 4 | 10 | 10 | 10 | 70 |

*CRC Rating Scale (Demerit)
 VLAL = Very light amber lacquer
 LAL = Light amber lacquer
 AL = Amber lacquer
 DBRL = Dark brown lacquer
 BL = Black lacquer
 ** = Gasohol
 *** = Unleaded gasoline

TABLE 10. CARBURETOR RATINGS (PERCENT AREA)
FOR FT. LEWIS, WA

M151A2 Jeep, 4-Cylinder, 140 CID Engines

| AFLRL Carburetor Number | Top Plate | | | Top Venturi | | | Bottom Plate | | | Bottom Venturi | | | | | | |
|-------------------------------|-----------|-----|----|-------------|-----|------|--------------|----|------|----------------|------|-----|----|------|----|----|
| | VLAL | LAL | AL | DBRL | BL* | VLAL | LAL | AL | DBRL | BL | VLAL | LAL | AL | DBRL | BL | |
| 7 | 10 | | 70 | 10 | 10 | 5 | | | 10 | 85 | 5 | | | 20 | 30 | 50 |
| 8 (Control) | 90 | 10 | | | | 100 | | | | | 100 | | | | | |
| 9 | 20 | 75 | | 5 | | 5 | 10 | 85 | | | 80 | 18 | 2 | | | |

Chrysler V-8, 318 CID Engines

| AFLRL Carburetor Number | Top Plate | | | Top Venturi | | | Bottom Plate | | | Bottom Venturi | | | | | | | | |
|-------------------------------|--------------------------|--|-----|-------------|------|-----|--------------|------|----|----------------|----|------|-----|----|------|----|----|----|
| | VLAL | | LAL | AL | DBRL | BL* | VLAL | VLAL | AL | DBRL | BL | VLAL | LAL | AL | DBRL | BL | | |
| | | | | | | | | | | | | | | | | | | |
| 10 (Control) | | | | 15 | 85 | 20 | 50 | 15 | 15 | 15 | 10 | 25 | 25 | 25 | 20 | 40 | 10 | 30 |
| 11 | Did not accompany engine | | | | | | | | | | | | | | | | | |
| 12 | | | | 20 | 80 | 10 | 10 | 10 | 70 | | 20 | 20 | 30 | 30 | 15 | 25 | 40 | 20 |

*CRC Rating Scale (Demerit)

VLAL - Very light amber lacquer

LAL - Light amber lacquer

AL - Amber lacquer

DBRL - Dark brown lacquer

BL - Black lacquer

TABLE 11. CARBURETOR RATINGS (PERCENT AREA)
FOR FT. MCCOY, WI

AMC, 6-Cylinder, 232 CID Engines

| AFRL Carburetor Number | Top Plate | | | Top Venturi | | | Bottom Plate | | | Bottom Venturi | | | | | | | | | | |
|------------------------------|-----------------|-----|----|-------------|----|------|--------------|----|------|----------------|------|-----|------|------------------------------------|-----|------|------|---|------|----|
| | LAL | | AL | DBRL | | BL* | VLAL | | LAL | AL | DBRL | BL | VLAL | | LAL | AL | DBRL | BL | | |
| | VLAL | LAL | AL | DBRL | BL | VLAL | LAL | AL | DBRL | BL | VLAL | LAL | AL | DBRL | BL | VLAL | LAL | AL | DBRL | BL |
| 16** | | 20 | | 80 | | | | | 10 | 90 | | | | Could not rate; Very heavy rust | | | | Could not rate; Very heavy corrosion | | |
| 17*** | 30 | 20 | | 30 | 20 | | | | 60 | 40 | 5 | 60 | 10 | 10 | 20 | | | | | |
| 18 | Not with engine | | | | | | | | | | | | | | | | | | | |

Ford V-8, 400 CID Engines

| AFRL Carburetor Number | Top Plate | | | Top Venturi | | | Bottom Plate | | | Bottom Venturi | | | | | |
|------------------------------|-----------------|-----|----|-------------|----|------|--------------|----|------|----------------|------|-----|----|------|----|
| | LAL | | AL | DBRL | | BL | LAL | | AL | DBRL | | BL | | | |
| | VLAL | LAL | AL | DBRL | BL | VLAL | LAL | AL | DBRL | BL | VLAL | LAL | AL | DBRL | BL |
| 13** | | | | 10 | 90 | | | | 20 | 80 | 100 | | | | |
| 14** | | 40 | 40 | 20 | | | | | 30 | 70 | | | | | |
| 15 | Not with engine | | | | | | | | | | | | | | |

*CRC Rating Scale (Demerit)
VLAL = Very light amber lacquer
LAL = Light amber lacquer
AL = Amber lacquer
DBRL = Dark brown lacquer
BL = Black lacquer
** = Gasohol
*** = Unleaded gasoline

TABLE 12. CRC WEIGHTED DEPOSIT RATINGS FOR
CARBURETOR LACQUER BUILD-UP*

| Engine Type/Station AFLRL Engine No. | Top Plate | Top Venturi | Bottom Plate | Bottom Venturi | WTD | |
|---|--------------|----------------|-----------------|-------------------|---------|----------------------|
| | | | | | Gasohol | Unleaded Gasoline |
| Chrysler V-8/Ft. Belvoir | | | | | | |
| 1 | 5.000 | 6.500 | 5.125 | 7.750 | 24 | -- |
| 2 (C)** | 5.750 | 9.000 | 5.000 | 6.750 | -- | 27 |
| 3 | 8.750 | 9.875 | 5.200 | 8.750 | 33 | -- |
| Chrysler V-8/Ft. Lewis | | | | | | |
| 10 (C) | 9.625 | 6.125 | 6.875 | 6.750 | -- | 29 |
| 11 - No Carburetor with Engine | | | | | | |
| 12 | 9.000 | 8.750 | 7.250 | 7.000 | 32 | -- |
| Jeep, 4 Cyl./Ft. Belvoir | | | | | | |
| 4 (C) | 9.750 | 9.625 | 5.000 | 7.375 | -- | 32 |
| 5 | 9.250 | 7.500 | 8.750 | 7.750 | 33 | -- |
| 6 | 8.000 | 7.250 | 8.000 | 7.750 | 31 | -- |
| Jeep, 4 Cyl./Ft. Lewis | | | | | | |
| 7 | 5.750 | 9.500 | 9.250 | 8.250 | 33 | -- |
| 8 (C) | 5.000 | 5.000 | 5.000 | 5.000 | -- | 20 |
| 9 | 5.125 | 5.000 | 5.050 | 5.000 | 20 | -- |
| Ford V-8/Ft. McCoy | | | | | | |
| 13 | 9.750 | 9.500 | 5.000 | 5.750 | 30 | -- |
| 14 | 5.500 | 9.250 | 7.250 | 8.500 | 31 | -- |
| 15 (C) No Carburetor with Engine | | | | | | |
| AMC, 6 Cyl./Ft. McCoy | | | | | | |
| 16 | 7.000 | 9.750 | + | ++ | -- | -- |
| 17 (C) | 6.750 | 8.500 | 5.125 | 6.250 | -- | 27 |
| 18 - No Carburetor with Engine | | | | | | |
| Average WTD | | | | | 30 | 27 |

*To achieve the values computed as Weighted Total Deposits (WTD), the Brown Deposit Scale on page 36 of the CRC Diesel Engine Rating Manual (CRC Manual No. 5) dated September 1958 and revised November 1959 were grouped as follows:

| Brown Deposit Scale | Color Factors | Combined As | Weighting Factor |
|----------------------|---------------|-------------|---------------------|
| RL, VLAL, LAL and AL | 1 through 5 | AL | 0.050 |
| BrL and DBrL | 6 and 7 | D Br L | 0.075 |
| VDBrL to BL | 8 through 10 | BL | 0.100 |

*0=Best rating (no lacquer); 10= Worst rating (Black lacquer)

** (C)=Control engine operated with unleaded gasoline

+ = Could not rate because of very heavy rust

++ = Could not rate because of very heavy corrosion

V. CONCLUSIONS

After consideration of the data generated, examined, and analyzed for this portion of the gasohol test only, the following conclusions are made:

- o There were no significant differences between engines and carburetors operated with gasohol and those operated with unleaded gasoline in the examined areas of wear or deposit ratings for any individual test site.
- o There were significant differences in the examined areas of wear or deposit ratings when comparing test results for engines and carburetors from different bases. This is attributed to variations in operating and maintenance procedures.
- o Tests conducted under similar circumstances for longer periods of time are needed to generate enough data for a definitive comparison of the long-term effects of the two test fuels.

VI. LIST OF REFERENCES

1. Tosh, J.D., et al., "Evaluation of Gasohol in U.S. Army Administrative and Tactical Vehicles, Report No. SwRI 573911, November 1982.
2. CRC Manual No. 8, "CRC Varnish Rating Manual for Non-Rubbing Parts" dated March 1964.
3. CRC Varnish Rating Manual (CRC Manual No. 9) dated June 1971.
4. CRC Manual No. 10: Sludge Rating Manual dated May 1966, Revised January 1969.
5. Techniques for Valve Rating (CRC Manual No. 4), Table 12, dated January 1958, Revised July 1969.

APPENDIX A
WEAR MEASUREMENTS

ENGINE COMPONENTS MEASUREMENTS

FT. BELVOIR, VA

ENGINE TYPE: JEEP, 4 CYLINDER, 140 CID

ENGINE NUMBER: 5001675 TYPE FUEL: UNLEADED GASOLINE

| Component | Cylinder No. | | | |
|-------------------------------|-----------------------|-------------------------------|---------------|----------|
| | 1 | 2 | 3 | 4 |
| Compression Ring Gaps | | | | |
| Top | 0.041 | 0.030 | 0.030 | 0.030 |
| Bottom | 0.037 | 0.030 | 0.030 | 0.030 |
| Cylinder Bore Diameter | | | | |
| Top | L ^a 3.8776 | T 3.8767 | L 3.8768 | T 3.8764 |
| Middle | 3.8767 | 3.8764 | 3.8763 | 3.8761 |
| Bottom | 3.8767 | 3.8765 | 3.8767 | 3.8765 |
| Out-of-round | 0.0011 | 0.0000 | 0.0004 | 0.0006 |
| Taper | 0.0007 | 0.0002 | 0.0003 | 0.0002 |
| Connecting Rod Bearings | | | | |
| Journal Diameter | H 1.9987 | V 1.9988 | H 1.9986 | V 1.9985 |
| Shell Diameter | F 1.9994 | B 1.9996 | F 1.9995 | B 1.9993 |
| Camshaft Lobe Lift | I 0.234 | E 0.222 | I 0.230 | E 0.215 |
| Valve Stem to Guide Clearance | I 0.0061 | F 0.0040 | I 0.0060 | E 0.0054 |
| Valve Spring Force (lb) | I 107 | E 110 | I 109 | E 108 |
| Piston Avg. Diameter | 3.8736 | 3.8739 | 3.8737 | 3.8733 |
| Middle and bottom of skirt | | | | |
| Main Bearings | No. 1 | No. 2 | No. 3 | |
| Journal Diameter | H 2.2480 | V 2.2484 | H 2.2484 | V 2.2484 |
| Shell Diameter | F 2.2526 | B 2.2529 | F 2.2528 | B 2.2524 |
| Compression Ring Gaps | | | | |
| Top | 0.010-0.027 | Camshaft Lobe Lift | | |
| Bottom | | Intake | 0.2369 | |
| Cylinder Bore Diameter | 3.8753-3.8777 | Exhaust | 0.2330 | |
| Out-of-round | 0.005 max | Valve Stem to Guide Clearance | | |
| Taper | 0.008 max | Intake | 0.0010-0.0025 | |
| Connecting Rod Bearings | | Exhaust | 0.0010-0.0035 | |
| Journal Diameter | 1.9982-1.9990 | Valve Spring Force (lb) | 132 at 1.505" | |
| Shell Diameter | 1.9992-2.0010 | wear limit-110 | | |

SI - Longitudinal, T - Transverse, H - Horizontal, V - Vertical,
F - Forward, B - Back, I - Intake, E - Exhaust
* - Measurements are in mm

3.8741-3.8765
2.2482-2.2490
2.2494-2.2512

Piston Diameter
Main Bearings
Journal Diameter
Shell Diameter

ENGINE COMPONENTS MEASUREMENTS

FT. BELVOIR, VA

ENGINE TYPE: JEEP, 4 CYLINDER, 140 CID

ENGINE NUMBER: 5001675 TYPE FUEL: UNLEADED GASOLINE

| Component | Cylinder No. | | | |
|-------------------------------|-------------------|-------------------------------|-----------------|---------------|
| | 1 | 2 | 3 | 4 |
| Compression Ring Gaps | | | | |
| Top | 1.04 ⁺ | 0.76 | 0.76 | 0.76 |
| Bottom | 0.94 | 0.76 | 0.76 | 0.76 |
| Cylinder Bore Diameter | | | | |
| Top | L 98.486 | T 98.458 | I 98.471 | T 98.461 |
| Middle | 98.468 | 98.478 | 98.461 | 98.453 |
| Bottom | 98.468 | 98.463 | 98.463 | 98.476 |
| Out-of-round | 0.028 | 0.000 | 0.010 | 0.015 |
| Taper | 0.018 | 0.005 | 0.008 | 0.005 |
| Connecting Rod Bearings | | | | |
| Journal Diameter | H 50.767 | V 50.770 | H 50.772 | V 50.762 |
| Shell Diameter | P 50.785 | B 50.790 | F 50.803 | B 50.782 |
| Camshaft Lobe Lift | I 5.94 | E 5.64 | I 5.66 | E 5.89 |
| Valve Stem to Guide Clearance | I 0.155 | E 0.102 | I 0.137 | E 0.142 |
| Valve Spring Force (N-m) | I 476 | E 489 | I 485 | E 489 |
| Piston Avg. Diameter | 98.389 | 98.397 | 98.392 | 98.382 |
| Middle and bottom of skirt | | | | |
| Main Bearings | | | | |
| Journal Diameter | No. 1 | No. 2 | No. 3 | No. 4 |
| Shell Diameter | H 57.100 | H 57.109 | H 57.109 | H 57.109 |
| | P 57.216 | F 57.214 | F 57.206 | F 57.221 |
| | V 57.100 | V 57.109 | V 57.109 | V 57.109 |
| | B 57.224 | B 57.206 | B 57.221 | B 57.211 |
| Compression Ring Gaps | | | | |
| Top | 0.25-0.69 | Camshaft Lobe Lift | 6.017 | 98.402-98.463 |
| Bottom | 98.433-98.494 | Intake | 5.918 | 57.104-57.125 |
| Cylinder Bore Diameter | 0.13 max | Exhaust | 0.025-0.064 | 57.135-57.180 |
| Out-of-round | 0.20 max | Valve Stem to Guide Clearance | 0.025-0.089 | |
| Taper | 50.754-50.775 | Intake | 587 at 38.23 mm | |
| Connecting Rod Bearings | 50.780-50.825 | Exhaust | Wear limit 489 | |
| Journal Diameter | | Valve Spring Force (N-m) | | |
| Shell Diameter | | | | |

H = Horizontal, T = Transverse, H = Horizontal, V = Vertical.

P = Forward, B = Back, I = Intake, E = Exhaust

+ = Measurements are in mm

ENGINE COMPONENTS MEASUREMENTS
FT. BELVOIR, VA
ENGINE TYPE: JEEP, 4 CYLINDER, 140 CID
ENGINE NUMBER: 6003049 TYPE FUEL: GASOHOL

| Component | Cylinder No. | | | |
|--------------------------------------|---------------|-------------------------------|---------------|--------|
| | 1 | 2 | 3 | 4 |
| Compression Ring Gaps | | | | |
| Top | 0.039 | 0.041 | 0.038 | 0.037 |
| Bottom | 0.050 | 0.044 | 0.042 | 0.044 |
| Cylinder Bore Diameter | | | | |
| Top | 3.8787 | 3.8795 | 3.8794 | 3.8788 |
| Middle | 3.8778 | 3.8789 | 3.8774 | 3.8783 |
| Bottom | 3.8782 | 3.8790 | 3.8777 | 3.8782 |
| Out-of-round | 0.0008 | 0.0005 | 0.0004 | 0.0005 |
| Taper | 0.0005 | 0.0001 | 0.0000 | 0.0001 |
| Connecting Rod Bearings | | | | |
| Journal Diameter | H | V | H | V |
| Shell Diameter | 1.9985 | 1.9985 | 1.9985 | 1.9984 |
| | F | F | F | F |
| | 2.0006 | 2.0010 | 2.0010 | 2.0004 |
| Camshaft Lobe Lift | | | | |
| | I | E | I | E |
| | 0.230 | 0.230 | 0.236 | 0.230 |
| Valve Stem to Guide Clearance | | | | |
| | I | E | I | E |
| | 0.0028 | 0.0027 | 0.0028 | 0.0029 |
| Valve Spring Force (lb) | | | | |
| | I | E | I | E |
| | 107 | 108 | 106 | 108 |
| Piston Avg. Diameter | 3.8745 | 3.8745 | 3.8746 | 3.8742 |
| Main Bearings | | | | |
| Journal Diameter | No. 1 | No. 2 | No. 3 | |
| | H | H | H | V |
| | 2.2485 | 2.2485 | 2.2486 | 2.2486 |
| Shell Diameter | F | F | F | B |
| | 2.2512 | 2.2510 | 2.2518 | 2.2520 |
| Compression Ring Gaps | | | | |
| Top | 0.010-0.027 | Camshaft Lobe Lift | | |
| Bottom | | Intake | 0.2369 | |
| Cylinder Bore Diameter | 3.8753-3.8777 | Exhaust | 0.2330 | |
| Out-of-round | 0.005 max | Valve Stem to Guide Clearance | | |
| Taper | 0.008 max | Intake | 0.0010-0.0025 | |
| Connecting Rod Bearings | | Exhaust | 0.0010-0.0035 | |
| Journal Diameter | 1.9982-1.9990 | Valve Spring Force (lb) | 132 at 1.505" | |
| Shell Diameter | 1.9992-2.0010 | wear limit-110 | | |

3.8741-3.8765
2.2482-2.2490
2.2494-2.2512

Piston Diameter
Main Bearing
Journal Diameter
Shell Diameter

Manufacturer's Service Limits, Inches

Camshaft Lobe Lift

0.010-0.027

Compression Ring Gaps

Top

Bottom

Cylinder Bore Diameter

Out-of-round

Taper

Connecting Rod Bearings

Journal Diameter

Shell Diameter

H = Horizontal, T = Transverse, H = Horizontal, V = Vertical,

F = Forward, B = Back, I = Intake, E = Exhaust

* - Measurements are in mm

ENGINE COMPONENTS MEASUREMENTS
FT. BELVOIR, VA
ENGINE TYPE: JEEP, 4 CYLINDER, 140 CID
ENGINE NUMBER: 6003049 TYPE FUEL: GASOHOL

| Component | Cylinder No. | | | |
|-------------------------------|-------------------|-------------------------------|-----------------|------------------|
| | 1 | 2 | 3 | 4 |
| Compression Ring Gaps | | | | |
| Top | 0.99 ⁺ | 1.04 | 0.97 | 0.94 |
| Bottom | 1.27 | 1.12 | 1.07 | 1.12 |
| Cylinder Bore Diameter | | | | |
| Top | L 98.519 | T 98.539 | L 98.486 | T 98.509 |
| Middle | 98.496 | 98.524 | 98.511 | 98.486 |
| Bottom | 98.506 | 98.527 | 98.519 | 98.494 |
| Out-of-round | 0.020 | 0.013 | 0.003 | 0.013 |
| Taper | 0.013 | 0.002 | 0.000 | 0.003 |
| Connecting Rod Bearings | | | | |
| Journal Diameter | H 50.762 | V 50.762 | H 50.762 | V 50.759 |
| Shell Diameter | F 50.815 | B 50.825 | F 50.825 | B 50.810 |
| Camshaft Lobe Lift | I 5.84 | E 5.84 | I 5.92 | E 5.84 |
| Valve Stem to Guide Clearance | I 0.071 | E 0.069 | I 0.071 | E 0.074 |
| Valve Spring Force (N-m) | I 476 | E 480 | I 472 | E 480 |
| Piston Avg. Diameter | 98.412 | 98.412 | 98.415 | 98.405 |
| Middle and bottom of skirt | | | | |
| Main Bearings | | | | |
| Journal Diameter | No. 1 H 57.112 | No. 2 V 57.109 | No. 3 H 57.144 | V 57.144 |
| Shell Diameter | F 57.180 | B 57.173 | F 57.196 | B 57.201 |
| Compression Ring Gaps | | | | |
| Top | 0.25-0.69 | Camshaft Lobe Lift | | |
| Bottom | 98.433-98.494 | Intake | 6.017 | Piston Diameter |
| Out-of-round | 0.13 max | Exhaust | 5.918 | Main Bearings |
| Taper | 0.20 max | Valve Stem to Guide Clearance | | Journal Diameter |
| Connecting Rod Bearings | | Intake | 0.025-0.064 | Shell Diameter |
| Journal Diameter | 50.754-50.775 | Exhaust | 0.025-0.089 | |
| Shell Diameter | 50.780-50.825 | Valve Spring Force (N-m) | 587 at 38.23 mm | |
| | | Wear Limit | 489 | |

98.402-98.463
57.104-57.125
57.135-57.180

HL = Longitudinal, T = Transverse, H = Horizontal, V = Vertical,
F = Forward, B = Back, I = Intake, E = Exhaust
+ = Measurements are in mm

ENGINE COMPONENTS MEASUREMENTS
FT. BELVOIR, VA
ENGINE TYPE: JEEP, 4 CYLINDER, 140 CID
ENGINE NUMBER: 500283 TYPE FUEL: GASOHOL

| Component | Cylinder No. | | | |
|-------------------------------|--------------|--------|--------|--------|
| | 1 | 2 | 3 | 4 |
| Compression Ring Gaps | | | | |
| Top | 0.022 | 0.023 | 0.021 | 0.025 |
| Bottom | 0.028 | 0.028 | 0.024 | 0.027 |
| Cylinder Bore Diameter | | | | |
| Top | 3.8763 | 3.8766 | 3.8764 | 3.8762 |
| Middle | 3.8768 | 3.8764 | 3.8762 | 3.8758 |
| Bottom | 3.8769 | 3.8767 | 3.8765 | 3.8756 |
| Out-of-round | 0.0003 | 0.0002 | 0.0003 | 0.0001 |
| Taper | 0.0004 | 0.0001 | 0.0000 | 0.0001 |
| Connecting Rod Bearings | | | | |
| Journal Diameter | | | | |
| Shell Diameter | | | | |
| Camshaft Lobe Lift | | | | |
| Valve Stem to Guide Clearance | | | | |
| Valve Spring Force (lb) | | | | |
| Piston Avg. Diameter | | | | |
| Middle and bottom of skirt | | | | |
| Main Bearings | | | | |
| Journal Diameter | | | | |
| Shell Diameter | | | | |
| Compression Ring Gaps | | | | |
| Top | | | | |
| Bottom | | | | |
| Cylinder Bore Diameter | | | | |
| Out-of-round | | | | |
| Taper | | | | |
| Connecting Rod Bearings | | | | |
| Journal Diameter | | | | |
| Shell Diameter | | | | |

L = Longitudinal, T = Transverse, H = Horizontal, V = Vertical,
 F = Forward, B = Back, I = Intake, E = Exhaust
 * - Measurements are in mm

3.8741-3.8765
 2.2482-2.2490
 2.2494-2.2512

Piston Diameter
 Main Bearings
 Journal Diameter
 Shell Diameter

0.2369
 0.2330
 0.0010-0.0025
 0.0010-0.0035
 132 at 1.505" wear limit-110

Camshaft Lobe Lift
 Intake
 Exhaust
 Valve Stem to Guide Clearance
 Intake
 Exhaust
 Valve Spring Force (lb)

Manufacturer's Service Limits, Inches

No. 2
 H 2.2484
 V 2.2485
 F 2.2508
 B 2.2509

No. 1
 H 2.2486
 V 2.2484
 F 2.2512
 B 2.2511

No. 3
 H 2.2484
 V 2.2483
 F 2.2512
 B 2.2511

ENGINE COMPONENTS MEASUREMENTS
FT. BELVOIR, VA
ENGINE TYPE: JEEP, 4 CYLINDER, 140 CID
ENGINE NUMBER: 500283 TYPE FUEL: GASOHOL

| Component | Cylinder No. | | | | | |
|-------------------------------|-------------------|--------|--------|--------|--------|--|
| | 1 | 2 | 3 | 4 | | |
| Compression Ring Caps | | | | | | |
| Top | 0.56 ⁺ | 0.58 | 0.53 | 0.64 | | |
| Bottom | 0.71 | 0.71 | 0.61 | 0.69 | | |
| Cylinder Bore Diameter | | | | | | |
| Top | 98.463 | 98.455 | 98.461 | 98.445 | 98.448 | |
| Middle | 98.471 | 98.463 | 98.455 | 98.440 | 98.440 | |
| Bottom | 98.473 | 98.468 | 98.471 | 98.448 | 98.443 | |
| Out-of-round | 0.008 | 0.005 | 0.008 | 0.003 | 0.003 | |
| Taper | 0.010 | 0.002 | 0.000 | 0.003 | 0.003 | |
| Connecting Rod Bearings | | | | | | |
| Journal Diameter | | | | | | |
| Shell Diameter | | | | | | |
| Camshaft Lobe Lift | | | | | | |
| Valve Stem to Guide Clearance | | | | | | |
| Valve Spring Force (N-m) | | | | | | |
| Piston Avg. Diameter | | | | | | |
| Middle and bottom of skirt | | | | | | |
| Main Bearings | | | | | | |
| Journal Diameter | | | | | | |
| Shell Diameter | | | | | | |
| Compression Ring Caps | | | | | | |
| Top | | | | | | |
| Bottom | | | | | | |
| Cylinder Bore Diameter | | | | | | |
| Out-of-round | | | | | | |
| Taper | | | | | | |
| Connecting Rod Bearings | | | | | | |
| Journal Diameter | | | | | | |
| Shell Diameter | | | | | | |

H = Horizontal, T = Transverse, H = Horizontal, V = Vertical,
 F = Forward, B = Back, I = Intake, E = Exhaust
 + = Measurements are in mm

ENGINE COMPONENTS MEASUREMENTS
FT. BELVOIR, VA
ENGINE TYPE: CHRYSLER V-8, 318 CID
ENGINE NO. 03223146 TYPE FUEL: UNLEADED GASOLINE

| Component | Cylinder No. | | | | | | | |
|--|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Compression Ring | | | | | | | | |
| Cups | | | | | | | | |
| Top | 0.030 | 0.029 | 0.028 | 0.032 | 0.029 | 0.028 | 0.026 | 0.026 |
| Bottom | 0.028 | 0.027 | 0.026 | 0.028 | 0.025 | 0.028 | 0.025 | 0.028 |
| Cylinder Bore | | | | | | | | |
| Diameter | | | | | | | | |
| L* | 3.9114 | 3.9114 | 3.9118 | 3.9121 | 3.9110 | 3.9122 | 3.9110 | 3.9124 |
| Top | 3.9120 | 3.9114 | 3.9118 | 3.9107 | 3.9106 | 3.9107 | 3.9106 | 3.9123 |
| Middle | 3.9112 | 3.9114 | 3.9110 | 3.9107 | 3.9106 | 3.9106 | 3.9106 | 3.9116 |
| Bottom | 3.9110 | 3.9115 | 3.9112 | 3.9111 | 3.9112 | 3.9113 | 3.9113 | 3.9118 |
| Out-of-round | 0.0006 | 0.0004 | 0.0010 | 0.0011 | 0.0011 | 0.0012 | 0.0012 | 0.0001 |
| Taper | 0.0004 | 0.0001 | 0.0007 | 0.0009 | 0.0004 | 0.0007 | 0.0003 | 0.0006 |
| Connecting Rod Bearings | | | | | | | | |
| Journal Diameter | | | | | | | | |
| H | 2.1237 | 2.1236 | 2.1232 | 2.1233 | 2.1236 | 2.1234 | 2.1236 | 2.1237 |
| F | 2.1265 | 2.1263 | 2.1269 | 2.1267 | 2.1268 | 2.1266 | 2.1262 | 2.1265 |
| Shell Diameter | | | | | | | | |
| I | 0.242 | 0.258 | 0.243 | 0.259 | 0.263 | 0.256 | 0.258 | 0.262 |
| E | 0.242 | 0.258 | 0.243 | 0.259 | 0.263 | 0.256 | 0.258 | 0.262 |
| Camshaft Lobe Lift | | | | | | | | |
| I | 0.0026 | 0.0020 | 0.0024 | 0.0025 | 0.0026 | 0.0021 | 0.0025 | 0.0024 |
| E | 0.0026 | 0.0020 | 0.0024 | 0.0025 | 0.0026 | 0.0021 | 0.0025 | 0.0024 |
| Valve Stem to Guide Clearance | | | | | | | | |
| I | 0.0026 | 0.0020 | 0.0024 | 0.0025 | 0.0026 | 0.0021 | 0.0025 | 0.0024 |
| E | 0.0026 | 0.0020 | 0.0024 | 0.0025 | 0.0026 | 0.0021 | 0.0025 | 0.0024 |
| Valve Spring Force (lb) | | | | | | | | |
| I | 78 | 80 | 80 | 78 | 76 | 80 | 78 | 80 |
| E | 78 | 80 | 80 | 78 | 76 | 80 | 78 | 80 |
| Piston Avg. Diameter Middle & bottom of skirt | | | | | | | | |
| 3.9105 | 3.9105 | 3.9105 | 3.9097 | 3.9102 | 3.9088 | 3.9086 | 3.9096 | 3.9086 |
| Main Bearings | | | | | | | | |
| Journal Diameter | | | | | | | | |
| H | 2.5000 | 2.4998 | 2.5004 | 2.4998 | 2.4999 | 2.4995 | 2.4996 | 2.4999 |
| F | 2.5022 | 2.5019 | 2.5015 | 2.5017 | 2.5026 | 2.5023 | 2.5025 | 2.5027 |
| Shell Diameter | | | | | | | | |
| I | 2.5022 | 2.5019 | 2.5015 | 2.5017 | 2.5026 | 2.5023 | 2.5025 | 2.5027 |
| E | 2.5022 | 2.5019 | 2.5015 | 2.5017 | 2.5026 | 2.5023 | 2.5025 | 2.5027 |
| Compression Ring Caps | | | | | | | | |
| Top | 0.010-0.020 | 0.010-0.020 | 0.010-0.020 | 0.010-0.020 | 0.010-0.020 | 0.010-0.020 | 0.010-0.020 | 0.010-0.020 |
| Bottom | 0.010-0.020 | 0.010-0.020 | 0.010-0.020 | 0.010-0.020 | 0.010-0.020 | 0.010-0.020 | 0.010-0.020 | 0.010-0.020 |
| Cylinder Bore Diameter | | | | | | | | |
| 3.9100-3.9120 | 3.9100-3.9120 | 3.9100-3.9120 | 3.9100-3.9120 | 3.9100-3.9120 | 3.9100-3.9120 | 3.9100-3.9120 | 3.9100-3.9120 | 3.9100-3.9120 |
| Out-of-round | 0.0050 max | 0.0050 max | 0.0050 max | 0.0050 max | 0.0050 max | 0.0050 max | 0.0050 max | 0.0050 max |
| Taper | 0.010 max | 0.010 max | 0.010 max | 0.010 max | 0.010 max | 0.010 max | 0.010 max | 0.010 max |
| Connecting Rod Bearings | | | | | | | | |
| Journal Diameter | | | | | | | | |
| H | 2.1240-2.1250 | 2.1240-2.1250 | 2.1240-2.1250 | 2.1240-2.1250 | 2.1240-2.1250 | 2.1240-2.1250 | 2.1240-2.1250 | 2.1240-2.1250 |
| F | 2.1245-2.1275 | 2.1245-2.1275 | 2.1245-2.1275 | 2.1245-2.1275 | 2.1245-2.1275 | 2.1245-2.1275 | 2.1245-2.1275 | 2.1245-2.1275 |
| Shell Diameter | | | | | | | | |
| H | 2.1240-2.1250 | 2.1240-2.1250 | 2.1240-2.1250 | 2.1240-2.1250 | 2.1240-2.1250 | 2.1240-2.1250 | 2.1240-2.1250 | 2.1240-2.1250 |
| F | 2.1245-2.1275 | 2.1245-2.1275 | 2.1245-2.1275 | 2.1245-2.1275 | 2.1245-2.1275 | 2.1245-2.1275 | 2.1245-2.1275 | 2.1245-2.1275 |

Manufacturer's Service Limits, Inches

| | | | | | | | | |
|--------------------------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| Compression Ring Caps | | | | | | | | |
| Top | 0.010-0.020 | 0.010-0.020 | 0.010-0.020 | 0.010-0.020 | 0.010-0.020 | 0.010-0.020 | 0.010-0.020 | 0.010-0.020 |
| Bottom | 0.010-0.020 | 0.010-0.020 | 0.010-0.020 | 0.010-0.020 | 0.010-0.020 | 0.010-0.020 | 0.010-0.020 | 0.010-0.020 |
| Cylinder Bore Diameter | | | | | | | | |
| 3.9100-3.9120 | 3.9100-3.9120 | 3.9100-3.9120 | 3.9100-3.9120 | 3.9100-3.9120 | 3.9100-3.9120 | 3.9100-3.9120 | 3.9100-3.9120 | 3.9100-3.9120 |
| Out-of-round | 0.0050 max | 0.0050 max | 0.0050 max | 0.0050 max | 0.0050 max | 0.0050 max | 0.0050 max | 0.0050 max |
| Taper | 0.010 max | 0.010 max | 0.010 max | 0.010 max | 0.010 max | 0.010 max | 0.010 max | 0.010 max |
| Connecting Rod Bearings | | | | | | | | |
| Journal Diameter | | | | | | | | |
| H | 2.1240-2.1250 | 2.1240-2.1250 | 2.1240-2.1250 | 2.1240-2.1250 | 2.1240-2.1250 | 2.1240-2.1250 | 2.1240-2.1250 | 2.1240-2.1250 |
| F | 2.1245-2.1275 | 2.1245-2.1275 | 2.1245-2.1275 | 2.1245-2.1275 | 2.1245-2.1275 | 2.1245-2.1275 | 2.1245-2.1275 | 2.1245-2.1275 |
| Shell Diameter | | | | | | | | |
| H | 2.1240-2.1250 | 2.1240-2.1250 | 2.1240-2.1250 | 2.1240-2.1250 | 2.1240-2.1250 | 2.1240-2.1250 | 2.1240-2.1250 | 2.1240-2.1250 |
| F | 2.1245-2.1275 | 2.1245-2.1275 | 2.1245-2.1275 | 2.1245-2.1275 | 2.1245-2.1275 | 2.1245-2.1275 | 2.1245-2.1275 | 2.1245-2.1275 |

L = Longitudinal, T = Transverse, H = Horizontal, V = Vertical,
 F = Forward, B = Back, I = Intake, E = Exhaust
 * = Measurements are in mm

ENGINE COMPONENTS MEASUREMENTS
FT. BELVOIR, VA
ENGINE TYPE: CHRYSLER V-8, 318 CID
ENGINE NUMBER: 03223146 TYPE FUEL: UNLEADED GASOLINE

| Component | Cylinder No. | | | | | | | | | |
|-----------------------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | |
| Compression Ring | | | | | | | | | | |
| Cape | | | | | | | | | | |
| Top | 0.76+ | 0.74 | 0.71 | 0.81 | 0.74 | 0.71 | 0.66 | 0.66 | | |
| Bottom | 0.71 | 0.69 | 0.66 | 0.71 | 0.64 | 0.71 | 0.64 | 0.71 | | |
| Cylinder Bore | | | | | | | | | | |
| Diameter | | | | | | | | | | |
| Top | 99.350 | 99.365 | 99.360 | 99.367 | 99.360 | 99.370 | 99.350 | 99.375 | 99.372 | |
| Middle | 99.342 | 99.344 | 99.350 | 99.339 | 99.332 | 99.332 | 99.329 | 99.327 | 99.362 | 99.355 |
| Bottom | 99.339 | 99.350 | 99.352 | 99.344 | 99.344 | 99.350 | 99.347 | 99.352 | 99.372 | 99.360 |
| Out-of-round | 0.015 | 0.010 | 0.026 | 0.028 | 0.028 | 0.031 | 0.030 | 0.003 | 0.003 | |
| Taper | 0.011 | 0.002 | 0.018 | 0.023 | 0.010 | 0.018 | 0.008 | 0.008 | 0.015 | |
| Connecting Rod | | | | | | | | | | |
| Bearings | | | | | | | | | | |
| Journal Diameter | | | | | | | | | | |
| H | 53.942 | 53.939 | 53.934 | 53.929 | 53.937 | 53.945 | 53.932 | 53.937 | 53.934 | 53.937 |
| F | 54.013 | 54.008 | 54.013 | 54.003 | 54.023 | 54.018 | 54.021 | 54.005 | 54.016 | 54.005 |
| Shell Diameter | | | | | | | | | | |
| H | 54.013 | 54.008 | 54.013 | 54.003 | 54.023 | 54.018 | 54.021 | 54.005 | 54.016 | 54.005 |
| F | 54.013 | 54.008 | 54.013 | 54.003 | 54.023 | 54.018 | 54.021 | 54.005 | 54.016 | 54.005 |
| Camshaft Lobe Lift | | | | | | | | | | |
| I | 6.15 | 6.55 | 6.12 | 6.58 | 6.17 | 6.58 | 6.07 | 6.50 | 6.55 | 6.15 |
| E | 6.15 | 6.55 | 6.12 | 6.58 | 6.17 | 6.58 | 6.07 | 6.50 | 6.55 | 6.15 |
| Valve Stem to Guide | | | | | | | | | | |
| Clearance | | | | | | | | | | |
| I | 0.066 | 0.051 | 0.053 | 0.061 | 0.061 | 0.064 | 0.058 | 0.066 | 0.064 | 0.066 |
| E | 0.066 | 0.051 | 0.053 | 0.061 | 0.061 | 0.064 | 0.058 | 0.066 | 0.064 | 0.066 |
| Valve Spring | | | | | | | | | | |
| Force (N-m) | | | | | | | | | | |
| I | 347 | 356 | 356 | 347 | 356 | 347 | 338 | 356 | 347 | 356 |
| E | 347 | 356 | 356 | 347 | 356 | 347 | 338 | 356 | 347 | 356 |
| Piston Avg. Diameter | | | | | | | | | | |
| Middle and bottom | | | | | | | | | | |
| of skirt | | | | | | | | | | |
| 99.327 | 99.327 | 99.327 | 99.306 | 99.319 | 99.284 | 99.278 | 99.304 | 99.278 | 99.278 | 99.278 |
| Main Bearings | | | | | | | | | | |
| Journal Diameter | | | | | | | | | | |
| H | 63.500 | 63.495 | 63.510 | 63.495 | 63.500 | 63.485 | 63.497 | 63.490 | 63.497 | 63.497 |
| F | 63.500 | 63.495 | 63.510 | 63.495 | 63.500 | 63.485 | 63.497 | 63.490 | 63.497 | 63.497 |
| Shell Diameter | | | | | | | | | | |
| H | 63.536 | 63.548 | 63.538 | 63.538 | 63.538 | 63.543 | 63.566 | 63.558 | 63.564 | 63.569 |
| F | 63.536 | 63.548 | 63.538 | 63.538 | 63.538 | 63.543 | 63.566 | 63.558 | 63.564 | 63.569 |
| Compression Ring Cape | | | | | | | | | | |
| Top | | | | | | | | | | |
| 0.25-0.51 | 0.25-0.51 | 0.25-0.51 | 0.25-0.51 | 0.25-0.51 | 0.25-0.51 | 0.25-0.51 | 0.25-0.51 | 0.25-0.51 | 0.25-0.51 | 0.25-0.51 |
| Bottom | | | | | | | | | | |
| 99.314-99.365 | 99.314-99.365 | 99.314-99.365 | 99.314-99.365 | 99.314-99.365 | 99.314-99.365 | 99.314-99.365 | 99.314-99.365 | 99.314-99.365 | 99.314-99.365 | 99.314-99.365 |
| Cylinder Bore Diameter | | | | | | | | | | |
| Out-of-round | | | | | | | | | | |
| 0.13 max | 0.13 max | 0.13 max | 0.13 max | 0.13 max | 0.13 max | 0.13 max | 0.13 max | 0.13 max | 0.13 max | 0.13 max |
| Taper | | | | | | | | | | |
| 0.25 max | 0.25 max | 0.25 max | 0.25 max | 0.25 max | 0.25 max | 0.25 max | 0.25 max | 0.25 max | 0.25 max | 0.25 max |
| Connecting Rod Bearings | | | | | | | | | | |
| Journal Diameter | | | | | | | | | | |
| 53.950-53.975 | 53.950-53.975 | 53.950-53.975 | 53.950-53.975 | 53.950-53.975 | 53.950-53.975 | 53.950-53.975 | 53.950-53.975 | 53.950-53.975 | 53.950-53.975 | 53.950-53.975 |
| Shell Diameter | | | | | | | | | | |
| 53.962-54.039 | 53.962-54.039 | 53.962-54.039 | 53.962-54.039 | 53.962-54.039 | 53.962-54.039 | 53.962-54.039 | 53.962-54.039 | 53.962-54.039 | 53.962-54.039 | 53.962-54.039 |
| Manufacturer's Service Limits, mm | | | | | | | | | | |
| Camshaft Lobe Lift | | | | | | | | | | |
| Intake | | | | | | | | | | |
| 6.325 | 6.325 | 6.325 | 6.325 | 6.325 | 6.325 | 6.325 | 6.325 | 6.325 | 6.325 | 6.325 |
| Exhaust | | | | | | | | | | |
| 6.782 | 6.782 | 6.782 | 6.782 | 6.782 | 6.782 | 6.782 | 6.782 | 6.782 | 6.782 | 6.782 |
| Valve Stem to Guide Clearance | | | | | | | | | | |
| Intake | | | | | | | | | | |
| 0.03-0.43 | 0.03-0.43 | 0.03-0.43 | 0.03-0.43 | 0.03-0.43 | 0.03-0.43 | 0.03-0.43 | 0.03-0.43 | 0.03-0.43 | 0.03-0.43 | 0.03-0.43 |
| Exhaust | | | | | | | | | | |
| 0.03-0.43 | 0.03-0.43 | 0.03-0.43 | 0.03-0.43 | 0.03-0.43 | 0.03-0.43 | 0.03-0.43 | 0.03-0.43 | 0.03-0.43 | 0.03-0.43 | 0.03-0.43 |
| Valve Spring Force (N-m) | | | | | | | | | | |
| 347-391 @ 42.86 mm | 347-391 @ 42.86 mm | 347-391 @ 42.86 mm | 347-391 @ 42.86 mm | 347-391 @ 42.86 mm | 347-391 @ 42.86 mm | 347-391 @ 42.86 mm | 347-391 @ 42.86 mm | 347-391 @ 42.86 mm | 347-391 @ 42.86 mm | 347-391 @ 42.86 mm |
| Piston Diameter | | | | | | | | | | |
| Main Bearings | | | | | | | | | | |
| Journal Diameter | | | | | | | | | | |
| 63.490 | 63.490 | 63.490 | 63.490 | 63.490 | 63.490 | 63.490 | 63.490 | 63.490 | 63.490 | 63.490 |
| Shell Diameter | | | | | | | | | | |
| 63.500-63.513 | 63.500-63.513 | 63.500-63.513 | 63.500-63.513 | 63.500-63.513 | 63.500-63.513 | 63.500-63.513 | 63.500-63.513 | 63.500-63.513 | 63.500-63.513 | 63.500-63.513 |

H = Horizontal, T = Transverse, H = Horizontal, V = Vertical,
 F = Forward, B = Back, I = Intake, E = Exhaust
 * = Measurements are in mm

ENGINE COMPONENTS MEASUREMENTS

FT. BELVOIR, VA

ENGINE TYPE: CHRYSLER V-8, 318 CID

ENGINE NUMBER: 07121303 TYPE FUEL: GASOHOL

| Component | Cylinder No. | | | | | | | |
|---|---------------|--------|--------|--------|--------|--------|--------|--------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Compression Ring | | | | | | | | |
| Cape | | | | | | | | |
| Top | 0.028 | 0.028 | 0.030 | 0.032 | 0.028 | 0.028 | 0.028 | 0.028 |
| Bottom | 0.032 | 0.035 | 0.035 | 0.032 | 0.030 | 0.032 | 0.035 | 0.035 |
| Cylinder Bore | | | | | | | | |
| Diameter | | | | | | | | |
| Top | 3.9116 | 3.9113 | 3.9124 | 3.9124 | 3.9119 | 3.9122 | 3.9118 | 3.9110 |
| Middle | 3.9110 | 3.9111 | 3.9122 | 3.9113 | 3.9109 | 3.9111 | 3.9104 | 3.9102 |
| Bottom | 3.9108 | 3.9110 | 3.9115 | 3.9115 | 3.9108 | 3.9112 | 3.9112 | 3.9112 |
| Out-of-round | 0.0003 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0006 | 0.0006 | 0.0007 |
| Taper | 0.0008 | 0.0002 | 0.0011 | 0.0010 | 0.0008 | 0.0008 | 0.0004 | 0.0007 |
| Connecting Rod | | | | | | | | |
| Bearings | | | | | | | | |
| Journal Diameter | 2.1237 | 2.1237 | 2.1237 | 2.1237 | 2.1239 | 2.1240 | 2.1240 | 2.1238 |
| Shell Diameter | 2.1262 | 2.1258 | 2.1261 | 2.1261 | 2.1258 | 2.1267 | 2.1267 | 2.1260 |
| Camshaft Lobe | | | | | | | | |
| Lift | 0.240 | 0.254 | 0.236 | 0.236 | 0.238 | 0.250 | 0.233 | 0.239 |
| Valve Stem to Guide Clearance | 0.0022 | 0.0026 | 0.0026 | 0.0020 | 0.0025 | 0.0021 | 0.0026 | 0.0024 |
| Valve Spring Force (lb) | 80 | 78 | 84 | 78 | 80 | 75 | 82 | 82 |
| Piston Avg. Diameter Middle & bottom of skirt | 3.9092 | 3.9091 | 3.9081 | 3.9090 | 3.9083 | 3.9084 | 3.9095 | 3.9093 |
| Main Bearings | | | | | | | | |
| Journal Diameter | 2.5000 | 2.5003 | 2.4996 | 2.4994 | 2.4992 | 2.4994 | 2.4994 | 2.4996 |
| Shell Diameter | 2.5022 | 2.5023 | 2.5023 | 2.5022 | 2.5037 | 2.5022 | 2.5034 | 2.5028 |
| Compression Ring Caps | | | | | | | | |
| Top | 0.010-0.020 | | | | | | | |
| Bottom | 3.9100-3.9120 | | | | | | | |
| Cylinder Bore Diameter | 0.0050 max | | | | | | | |
| Out-of-round | 0.010 max | | | | | | | |
| Taper | 2.1240-2.1250 | | | | | | | |
| Connecting Rod Bearings | 2.1245-2.1275 | | | | | | | |
| Journal Diameter | | | | | | | | |
| Shell Diameter | | | | | | | | |

Manufacturer's Service Limits, Inches

Camshaft Lobe Lift
Intake 0.249
Exhaust 0.267
Valve Stem to Guide Clearance 0.001-0.017
Intake 0.001-0.017
Exhaust 0.001-0.017
Valve Spring Force (lb) 78-88 lb at 1-11/16"

Piston Diameter
Main Bearing 3.9085-3.9115
Journal Diameter 2.4995-2.5005
Shell Diameter 2.5000-2.5030

Man - Longitudinal, T - Transverse, H - Horizontal, V - Vertical,
F - Forward, B - Back, I - Intake, E - Exhaust
+ = Measurements are in mm

ENGINE COMPONENTS MEASUREMENTS
FT. BELVOIR, VA
ENGINE TYPE: CHRYSLER V-8, 318 CID
ENGINE NUMBER: 07121303 TYPE FUEL: GASOLIN

| Component | Cylinder No. | | | | | | | |
|------------------------------|---------------|--------|--------|--------|--------|--------|--------|--------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Compression Ring | | | | | | | | |
| Gaps | | | | | | | | |
| Top | 0.71* | 0.71 | 0.76 | 0.81 | 0.71 | 0.71 | 0.71 | 0.71 |
| Bottom | 0.81 | 0.89 | 0.89 | 0.81 | 0.76 | 0.81 | 0.89 | 0.89 |
| Cylinder Bore | | | | | | | | |
| Diameter | | | | | | | | |
| Top | 99.355 | 99.347 | 99.372 | 99.375 | 99.362 | 99.360 | 99.347 | 99.355 |
| Middle | 99.339 | 99.342 | 99.370 | 99.347 | 99.344 | 99.344 | 99.344 | 99.360 |
| Bottom | 99.334 | 99.339 | 99.352 | 99.352 | 99.334 | 99.340 | 99.337 | 99.352 |
| Out-of-round | 0.008 | 0.003 | 0.002 | 0.002 | 0.002 | 0.023 | 0.017 | 0.025 |
| Taper | 0.021 | 0.005 | 0.028 | 0.026 | 0.021 | 0.020 | 0.010 | 0.018 |
| Connecting Rod | | | | | | | | |
| Bearings | | | | | | | | |
| Journal Diameter | 53.942 | 53.942 | 53.942 | 53.942 | 53.942 | 53.942 | 53.942 | 53.942 |
| Shell Diameter | 54.003 | 54.003 | 54.003 | 54.003 | 54.003 | 54.003 | 54.003 | 54.003 |
| Camshaft Lobe | | | | | | | | |
| Lift | 6.10 | 6.45 | 6.50 | 6.35 | 6.05 | 6.07 | 6.48 | 6.25 |
| Valve Stem to | | | | | | | | |
| Guide Clearance | 0.056 | 0.066 | 0.051 | 0.064 | 0.053 | 0.066 | 0.058 | 0.066 |
| Valve Spring | | | | | | | | |
| Force (N-m) | 356 | 347 | 374 | 347 | 356 | 334 | 365 | 347 |
| Piston Avg. Diameter | | | | | | | | |
| Middle & Bottom | 99.294 | 99.291 | 99.266 | 99.289 | 99.271 | 99.273 | 99.301 | 99.296 |
| Main Bearings | | | | | | | | |
| Journal Diameter | 63.500 | 63.508 | 63.490 | 63.480 | 63.485 | 63.485 | 63.487 | 63.490 |
| Shell Diameter | 63.556 | 63.558 | 63.556 | 63.556 | 63.556 | 63.556 | 63.564 | 63.571 |
| Compression Ring Gaps | | | | | | | | |
| Top | 0.25-0.51 | | | | | | | |
| Bottom | 99.314-99.365 | | | | | | | |
| Cylinder Bore Diameter | 0.13 max | | | | | | | |
| Out-of-round | 0.25 max | | | | | | | |
| Taper | 53.950-53.975 | | | | | | | |
| Connecting Rod Bearings | 53.962-54.039 | | | | | | | |
| Journal Diameter | | | | | | | | |
| Shell Diameter | | | | | | | | |

Manufacturer's Service Limits, mm

| | | |
|--------------------------------------|--------------------|-------|
| Camshaft Lobe Lift | 6.325 | 6.782 |
| Intake | | |
| Exhaust | | |
| Valve Stem to Guide Clearance | 0.03-0.43 | |
| Intake | | |
| Exhaust | | |
| Valve Spring Force (N-m) | 347-391 @ 42.86 mm | |
| Piston Diameter | | |
| Main Bearings | 99.276-99.352 | |
| Journal Diameter | 63.487-63.513 | |
| Shell Diameter | 63.500-63.576 | |

* - Longitudinal, T = Transverse, H = Horizontal, V = Vertical,
 F = Forward, B = Back, I = Intake, E = Exhaust
 * - Measurements are in mm

ENGINE COMPONENTS MEASUREMENTS

FT. BELVOIR, VA

ENGINE TYPE: CHRYSLER V-8, 318 CID

ENGINE NUMBER: 07090311 TYPE FUEL: GASOHOL

| Component | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|--------|---------------|--------|--------|--------|--------|--------|--------|
| Cylinder No. | | | | | | | | |
| Compression Ring | | | | | | | | |
| Cape | | | | | | | | |
| Top | | 0.032 | 0.024 | 0.027 | 0.022 | 0.023 | 0.024 | 0.031 |
| Bottom | | 0.028 | 0.035 | 0.031 | 0.026 | 0.028 | 0.035 | 0.028 |
| Cylinder Bore | | | | | | | | |
| Diameter | | | | | | | | |
| Top | L | T | L | T | L | T | L | T |
| Middle | 3.9119 | 3.9127 | 3.9109 | 3.9106 | 3.9115 | 3.9104 | 3.9117 | 3.9107 |
| Bottom | 3.9107 | 3.9111 | 3.9108 | 3.9102 | 3.9113 | 3.9100 | 3.9112 | 3.9100 |
| Out-of-round | 3.9107 | 3.9110 | 3.9107 | 3.9102 | 3.9110 | 3.9105 | 3.9108 | 3.9111 |
| Taper | 0.0008 | 0.0003 | 0.0014 | 0.0011 | 0.0011 | 0.0010 | 0.0016 | 0.0010 |
| Taper | 0.0012 | 0.0002 | 0.0009 | 0.0007 | 0.0010 | 0.0008 | 0.0008 | 0.0008 |
| Connecting Rod | | | | | | | | |
| Bearing | | | | | | | | |
| Journal Diameter | H | V | H | V | H | V | H | V |
| Shell Diameter | 2.1238 | 2.1239 | 2.1237 | 2.1235 | 2.1236 | 2.1237 | 2.1237 | 2.1235 |
| Camshaft Lobe Lift | 2.1267 | 2.1266 | 2.1270 | 2.1272 | 2.1261 | 2.1262 | 2.1268 | 2.1267 |
| Valve Stem to Guide Clearance | I | E | I | E | I | E | I | E |
| Valve Spring Force (lb) | 0.240 | 0.262 | 0.242 | 0.262 | 0.241 | 0.231 | 0.244 | 0.264 |
| Piston Avg. Diameter Middle & bottom of skirt | I | E | I | E | I | E | I | E |
| Main Bearings | 0.0022 | 0.0021 | 0.0023 | 0.0020 | 0.0024 | 0.0026 | 0.0023 | 0.0025 |
| Journal Diameter | 83 | 78 | 80 | 78 | 84 | 80 | 78 | 80 |
| Shell Diameter | I | E | I | E | I | E | I | E |
| Main Bearings | 3.9091 | 3.9092 | 3.9083 | 3.9082 | 3.9086 | 3.9094 | 3.9095 | 3.9091 |
| Journal Diameter | No. 1 | No. 2 | No. 3 | No. 4 | No. 5 | No. 6 | No. 7 | No. 8 |
| Shell Diameter | 2.4992 | 2.4994 | 2.4994 | 2.4994 | 2.4995 | 2.4997 | 2.4997 | 2.4992 |
| Main Bearings | 2.5022 | 2.5026 | 2.5028 | 2.5027 | 2.5045 | 2.5024 | 2.5026 | 2.5023 |
| Compression Ring Caps | | | | | | | | |
| Top | | 0.010-0.020 | | | | | | |
| Bottom | | 3.9100-3.9120 | | | | | | |
| Cylinder Bore Diameter | | 0.0050 max | | | | | | |
| Taper | | 0.010 max | | | | | | |
| Connecting Rod Bearings | | 2.1240-2.1250 | | | | | | |
| Journal Diameter | | 2.1245-2.1275 | | | | | | |
| Shell Diameter | | | | | | | | |

Manufacturer's Service Limits, Inches

Camshaft Lobe Lift

Intake 0.249

Exhaust 0.267

Valve Stem to Guide Clearance

Intake 0.001-0.017

Exhaust 0.001-0.017

Valve Spring Force (lb) 78-88 lb at 1-11/16"

Piston Diameter

Main Bearings 3.9085-3.9115

Journal Diameter 2.4995-2.5005

Shell Diameter 2.5000-2.5030

Longitudinal, T = Transverse, H = Horizontal, V = Vertical.

F = Forward, B = Back, I = Intake, E = Exhaust

* - Measurements are in mm

ENGINE COMPONENTS MEASUREMENTS
FT. BELVOIR, VA
ENGINE TYPE: CHRYSLER V-8, 318 CID
ENGINE NUMBER: 07090311 TYPE FUEL: GASOHOL

| Component | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|--------------------|--------|--------|--------|--------|--------|--------|--------|
| Cylinder No. | | | | | | | | |
| Compression Ring Gaps | | | | | | | | |
| Top | | 0.81 | 0.61 | 0.69 | 0.56 | 0.58 | 0.61 | 0.79 |
| Bottom | | 0.84 | 0.89 | 0.79 | 0.66 | 0.71 | 0.89 | 0.71 |
| Cylinder Bore Diameter | | | | | | | | |
| Top | 99.362 | 99.337 | 99.329 | 99.362 | 99.327 | 99.352 | 99.332 | 99.322 |
| Middle | 99.332 | 99.342 | 99.334 | 99.334 | 99.317 | 99.344 | 99.314 | 99.352 |
| Bottom | 99.332 | 99.339 | 99.332 | 99.339 | 99.337 | 99.334 | 99.342 | 99.327 |
| Out-of-round | 0.021 | 0.008 | 0.035 | 0.028 | 0.028 | 0.025 | 0.040 | 0.026 |
| Taper | 0.030 | 0.005 | 0.023 | 0.018 | 0.026 | 0.015 | 0.020 | 0.021 |
| Connecting Rod Bearings | | | | | | | | |
| Journal Diameter | | | | | | | | |
| Shell Diameter | 53.945 | 53.947 | 53.942 | 53.937 | 53.945 | 53.942 | 53.942 | 53.937 |
| Camshaft Lobe Lift | 6.10 | 6.65 | 6.15 | 6.65 | 6.12 | 6.38 | 6.71 | 6.07 |
| Valve Stem to Guide Clearance | 0.056 | 0.053 | 0.058 | 0.051 | 0.058 | 0.061 | 0.066 | 0.061 |
| Valve Spring Force (N-m) | 369 | 347 | 356 | 347 | 356 | 347 | 347 | 356 |
| Piston Avg. Diameter Middle & bottom of skirt | 99.291 | 99.294 | 99.271 | 99.268 | 99.278 | 99.299 | 99.301 | 99.291 |
| Main Bearings | | | | | | | | |
| Journal Diameter | | | | | | | | |
| Shell Diameter | 63.480 | 63.386 | 63.485 | 63.487 | 63.487 | 63.487 | 63.485 | 63.480 |
| Compression Ring Gaps | | | | | | | | |
| Top | 0.25-0.51 | | | | | | | |
| Bottom | 99.314-99.365 | | | | | | | |
| Cylinder Bore Diameter | 0.13 max | | | | | | | |
| Out-of-round | 0.25 max | | | | | | | |
| Taper | 53.950-53.975 | | | | | | | |
| Connecting Rod Bearings | 53.962-54.039 | | | | | | | |
| Journal Diameter | | | | | | | | |
| Shell Diameter | | | | | | | | |
| Manufacturer's Service Limits, mm | | | | | | | | |
| Camshaft Lobe Lift | | | | | | | | |
| Intake | 6.325 | | | | | | | |
| Exhaust | 6.782 | | | | | | | |
| Valve Stem to Guide Clearance | 0.03-0.43 | | | | | | | |
| Intake | | | | | | | | |
| Exhaust | | | | | | | | |
| Valve Spring Force (N-m) | 347-391 @ 42.86 mm | | | | | | | |
| Piston Diameter | | | | | | | | |
| Main Bearings | | | | | | | | |
| Journal Diameter | | | | | | | | |
| Shell Diameter | | | | | | | | |
| Platen Diameter | | | | | | | | |
| Main Bearings | | | | | | | | |
| Journal Diameter | | | | | | | | |
| Shell Diameter | | | | | | | | |

H = Horizontal, V = Vertical,
 F = Forward, B = Back, I = Intake, E = Exhaust
 * = Measurements are in mm

ENGINE COMPONENTS MEASUREMENTS

FT. LEWIS, WA

ENGINE TYPE: JEEP, 4 CYLINDER, 140 CID

ENGINE NUMBER: 235880 TYPE FUEL: UNLEADED GASOLINE

| Component | Cylinder No. | | | |
|-------------------------------|---------------|---------------|---------------|---------------|
| | 1 | 2 | 3 | 4 |
| Compression Ring Gaps | | | | |
| Top | 0.039 | 0.056 | 0.058 | 0.056 |
| Bottom | 0.071 | 0.074 | 0.074 | 0.070 |
| Cylinder Bore Diameter | | | | |
| Top | 3.8784 | 3.8794 | 3.8803 | 3.8768 |
| Middle | 3.8776 | 3.8781 | 3.8785 | 3.8777 |
| Bottom | 3.8763 | 3.8773 | 3.8769 | 3.8773 |
| Out-of-round | 0.0010 | 0.0020 | 0.0015 | 0.0014 |
| Taper | 0.0021 | 0.0014 | 0.0013 | 0.0012 |
| Connecting Rod Bearings | | | | |
| Journal Diameter | H 1.987 | V 1.988 | H 1.987 | V 1.988 |
| Shell Diameter | F 2.0022 | E 2.0018 | F 2.0020 | E 2.0019 |
| Camshaft Lobe Lift | I 0.204 | E 0.235 | I 0.225 | E 0.232 |
| Valve Stem to Guide Clearance | I 0.0053 | E 0.0059 | I 0.0051 | E 0.0058 |
| Valve Spring Force (lb) | I 108 | E 104 | I 107 | E 108 |
| Piston Avg. Diameter | 3.8740 | 3.8738 | 3.8742 | 3.8737 |
| Main Bearings | | | | |
| Journal Diameter | H 2.2484 | V 2.2485 | H 2.2484 | V 2.2484 |
| Shell Diameter | F 2.2513 | E 2.2511 | F 2.2534 | E 2.2530 |
| Compression Ring Gaps | | | | |
| Top | 0.010-0.027 | 0.010-0.027 | 0.010-0.027 | 0.010-0.027 |
| Bottom | 3.8753-3.8777 | 3.8753-3.8777 | 3.8753-3.8777 | 3.8753-3.8777 |
| Cylinder Bore Diameter | 0.005 max | 0.005 max | 0.005 max | 0.005 max |
| Out-of-round | 0.008 max | 0.008 max | 0.008 max | 0.008 max |
| Taper | 1.9982-1.9990 | 1.9982-1.9990 | 1.9982-1.9990 | 1.9982-1.9990 |
| Journal Diameter | 1.9992-2.0010 | 1.9992-2.0010 | 1.9992-2.0010 | 1.9992-2.0010 |
| Shell Diameter | | | | |

Manufacturer's Service Limits, Inches

3.8741-3.8765
2.2482-2.2490
2.2494-2.2512

Piston Diameter
Main Bearings
Journal Diameter
Shell Diameter

Camshaft Lobe Lift
Intake 0.2369
Exhaust 0.2330
Valve Stem to Guide Clearance 0.0010-0.0025
Intake 0.0010-0.0035
Exhaust 132 at 1.505"
Valve Spring Force (lb) wear limit-110

H = Horizontal, V = Vertical,
F = Forward, B = Back, I = Intake, E = Exhaust
* = Measurements are in mm

ENGINE COMPONENTS MEASUREMENTS

FT. LEWIS, WA

ENGINE TYPE: JEEP, 4 CYLINDER, 140 CID

ENGINE NUMBER: 235880 TYPE FUEL: UNLEADED GASOLINE

| Component | Cylinder No. | | | |
|-------------------------------|--------------|--------|--------|--------|
| | 1 | 2 | 3 | 4 |
| Compression Ring Gaps | | | | |
| Top | 0.95* | 1.42 | 1.47 | 1.42 |
| Bottom | 1.80 | 1.88 | 1.88 | 1.78 |
| Cylinder Bore Diameter | | | | |
| Top | 98.511 | 98.509 | 98.509 | 98.499 |
| Middle | 98.491 | 98.514 | 98.496 | 98.486 |
| Bottom | 98.458 | 98.473 | 98.476 | 98.468 |
| Out-of-round | 0.026 | 0.051 | 0.038 | 0.035 |
| Taper | 0.053 | 0.036 | 0.033 | 0.031 |
| Connecting Rod Bearings | | | | |
| Journal Diameter | | | | |
| Shell Diameter | | | | |
| Camshaft Lobe Lift | | | | |
| Valve Stem to Guide Clearance | | | | |
| Valve Spring Force (N-m) | | | | |
| Piston Avg. Diameter | | | | |
| Middle and bottom of skirt | | | | |
| Main Bearings | | | | |
| Journal Diameter | | | | |
| Shell Diameter | | | | |
| Compression Ring Gaps | | | | |
| Top | | | | |
| Bottom | | | | |
| Cylinder Bore Diameter | | | | |
| Out-of-round | | | | |
| Taper | | | | |
| Connecting Rod Bearings | | | | |
| Journal Diameter | | | | |
| Shell Diameter | | | | |

98.402-98.463
57.104-57.125
57.135-57.180

Piston Diameter
Main Bearings
Journal Diameter
Shell Diameter

6.017
5.918
0.025-0.064
0.025-0.089
587 at 38.23 mm
Wear limit 489

Camshaft Lobe Lift
Intake
Exhaust
Valve Stem to Guide Clearance
Intake
Exhaust
Valve Spring Force (N-m)

0.25-0.69
98.433-98.494
0.13 max
0.20 max
50.754-50.775
50.780-50.825

98.402-98.463
57.104-57.125
57.135-57.180

ENGINE COMPONENTS MEASUREMENTS
FT. LEWIS, WA
ENGINE TYPE: JEEP, 4 CYLINDER, 140 CID
ENGINE NUMBER: 251891 TYPE FUEL: GASOHOL

| Component | Cylinder No. | | | |
|-------------------------------|---------------|-------------------------------|---------------|--------|
| | 1 | 2 | 3 | 4 |
| Compression Ring Gaps | | | | |
| Top | 0.048 | 0.054 | 0.051 | 0.049 |
| Bottom | 0.067 | 0.072 | 0.071 | 0.068 |
| Cylinder Bore Diameter | | | | |
| Top | 3.8782 | 3.8793 | 3.8777 | 3.8784 |
| Middle | 3.8773 | 3.8778 | 3.8771 | 3.8774 |
| Bottom | 3.8771 | 3.8776 | 3.8774 | 3.8773 |
| Out-of-round | 0.0011 | 0.0007 | 0.0006 | 0.0004 |
| Taper | 0.0011 | 0.0003 | 0.0003 | 0.0004 |
| Connecting Rod Bearings | | | | |
| Journal Diameter | H | V | H | V |
| Shell Diameter | 1.9988 | 1.9987 | 1.9988 | 1.9987 |
| | F | F | F | F |
| | 2.0013 | 2.0012 | 2.0004 | 2.0025 |
| Camshaft Lobe Lift | I | E | I | E |
| | 0.244 | 0.236 | 0.241 | 0.235 |
| Valve Stem to Guide Clearance | I | E | I | E |
| | 0.0063 | 0.0045 | 0.0052 | 0.0054 |
| Valve Spring Force (lb) | I | E | I | E |
| | 109 | 110 | 106 | 108 |
| Piston Avg. Diameter | 3.8738 | 3.8738 | 3.8735 | 3.8730 |
| Middle and bottom of skirt | | | | |
| Main Bearings | No. 1 | No. 2 | No. 3 | No. 3 |
| Journal Diameter | H | H | H | H |
| | 2.2485 | 2.2486 | 2.2485 | 2.2486 |
| Shell Diameter | F | F | F | F |
| | 2.2523 | 2.2522 | 2.2528 | 2.2532 |
| Compression Ring Gaps | | | | |
| Top | 0.010-0.027 | Camshaft Lobe Lift | | |
| Bottom | 3.8753-3.8777 | Intake | 0.2369 | |
| Cylinder Bore Diameter | 0.003 max | Exhaust | 0.2330 | |
| Out-of-round | 0.008 max | Valve Stem to Guide Clearance | | |
| Taper | | Intake | 0.0010-0.0025 | |
| Connecting Rod Bearings | | Exhaust | 0.0010-0.0035 | |
| Journal Diameter | 1.9982-1.9990 | Valve Spring Force (lb) | 132 at 1.505" | |
| Shell Diameter | 1.9992-2.0010 | wear limit-110 | | |

H = Horizontal, V = Vertical,
 F = Forward, B = Back, I = Intake, E = Exhaust
 * = Measurements are in mm

ENGINE COMPONENTS MEASUREMENTS

ENGINE TYPE: JEEP. 4 CYLINDER. 140 CID

ENGINE NUMBER: 251891 TYPE FUEL: GASOHOL

| Component | 1 | 2 | 3 | 4 | 5 | 6 |
|-----------------------------------|-------------------|----------|----------|----------|----------|----------|
| Compression Ring Caps | | | | | | |
| Top | 1.22 ⁺ | 1.37 | 1.30 | 1.24 | | |
| Bottom | 1.70 | 1.83 | 1.80 | 1.73 | | |
| Cylinder Bore Diameter | | | | | | |
| Top | L 98.506 | L 98.494 | L 98.471 | L 98.476 | L 98.486 | T 98.486 |
| Middle | 98.483 | 98.478 | 98.458 | 98.463 | 98.463 | 98.468 |
| Bottom | 98.478 | 98.486 | 98.463 | 98.468 | 98.466 | 98.473 |
| Out-of-round | 0.028 | 0.017 | 0.015 | 0.010 | | |
| Taper | 0.028 | 0.008 | 0.008 | 0.010 | | |
| Connecting Rod Bearings | | | | | | |
| Journal Diameter | H 50.770 | H 50.767 | H 50.770 | H 50.767 | H 50.767 | V 50.767 |
| Shell Diameter | F 50.833 | F 50.830 | F 50.810 | F 50.830 | F 50.864 | B 50.861 |
| Camshaft Lobe Lift | I 6.20 | I 6.15 | I 6.12 | I 6.10 | I 6.10 | E 5.97 |
| Valve Stem to Guide Clearance | I 0.160 | I 0.132 | I 0.137 | I 0.127 | I 0.170 | E 0.137 |
| Valve Spring Force (N-m) | I 485 | I 472 | I 480 | I 472 | I 472 | E 480 |
| Piston Avg. Diameter | 98.395 | 98.395 | 98.387 | 98.374 | | |
| Middle and bottom of skirt | | | | | | |
| Main Bearings | | | | | | |
| Journal Diameter | H 57.112 | H 57.112 | H 57.112 | H 57.112 | H 57.109 | V 57.112 |
| Shell Diameter | F 57.208 | F 57.208 | F 57.221 | F 57.221 | F 57.231 | B 57.231 |
| Compression Ring Caps | | | | | | |
| Top | 0.25-0.69 | | | | | |
| Bottom | 98.433-98.494 | | | | | |
| Cylinder Bore Diameter | 0.13 max | | | | | |
| Out-of-round | 0.20 max | | | | | |
| Taper | 50.754-50.775 | | | | | |
| Connecting Rod Bearings | | | | | | |
| Journal Diameter | 50.780-50.825 | | | | | |
| Shell Diameter | | | | | | |
| Manufacturer's Service Limits, mm | | | | | | |
| Camshaft Lobe Lift | | | | | | |
| Intake | | | | | | |
| Exhaust | | | | | | |
| Valve Stem to Guide Clearance | | | | | | |
| Intake | | | | | | |
| Exhaust | | | | | | |
| Valve Spring Force (N-m) | | | | | | |
| Wear limit | | | | | | |
| Piston Diameter | | | | | | |
| Main Bearings | | | | | | |
| Journal Diameter | | | | | | |
| Shell Diameter | | | | | | |
| 98.402-98.463 | | | | | | |
| 57.104-57.125 | | | | | | |
| 57.135-57.180 | | | | | | |

dL = Longitudinal, T = Transversal, H = Horizontal, V = Vertical,
 F = Forward, B = Back, I = Intake, E = Exhaust
 * Measurements are in mm

ENGINE COMPONENTS MEASUREMENTS
FT. LEWIS, WA
ENGINE TYPE: JEEP, 4 CYLINDER, 140 CID
ENGINE NUMBER: 235875 TYPE FUEL: GASOHOL

| Component | Cylinder No. | | | |
|--------------------------------------|---------------|-------------------------------|---------------|------------------|
| | 1 | 2 | 3 | 4 |
| Compression Ring Gaps | | | | |
| Top | 0.052 | 0.056 | 0.055 | 0.054 |
| Bottom | 0.072 | 0.079 | 0.060 | 0.064 |
| Cylinder Bore Diameter | | | | |
| Top | 3.8767 | 3.8775 | 3.8789 | 3.8779 |
| Middle | 3.8762 | 3.8768 | 3.8770 | 3.8773 |
| Bottom | 3.8757 | 3.8763 | 3.8764 | 3.8765 |
| Out-of-round | 0.0008 | 0.0012 | 0.0011 | 0.0014 |
| Taper | 0.0010 | 0.0014 | 0.0006 | 0.0007 |
| Connecting Rod Bearings | | | | |
| Journal Diameter | H | V | H | V |
| Shell Diameter | 1.9981 | 1.9980 | 1.9982 | 1.9982 |
| | F | B | F | B |
| | 2.0035 | 2.0034 | 2.0014 | 2.0018 |
| Camshaft Lobe Lift | I | E | I | E |
| | 0.239 | 0.236 | 0.235 | 0.234 |
| Valve Stem to Guide Clearance | I | E | I | E |
| | 0.0072 | 0.0100 | 0.0067 | 0.0067 |
| Valve Spring Force (lb) | I | E | I | E |
| | 104 | 102 | 106 | 105 |
| Piston Avg. Diameter | 3.8734 | 3.8732 | 3.8721 | 3.8731 |
| Middle and bottom of skirt | | | | |
| Main Bearings | No. 1 | No. 2 | No. 3 | |
| Journal Diameter | H | H | H | V |
| | 2.2463 | 2.2464 | 2.2483 | 2.2480 |
| | F | F | F | B |
| Shell Diameter | 2.2526 | 2.2527 | 2.2524 | 2.2531 |
| Compression Ring Gaps | | | | |
| Top | 0.010-0.027 | Camshaft Lobe Lift | | |
| Bottom | | Intake | 0.2369 | Piston Diameter |
| Cylinder Bore Diameter | 3.8753-3.8777 | Exhaust | 0.2330 | Main Bearings |
| Out-of-round | 0.005 max | Valve Stem to Guide Clearance | | Journal Diameter |
| Taper | 0.008 max | Intake | 0.0010-0.0025 | Shell Diameter |
| Connecting Rod Bearings | | Exhaust | 0.0010-0.0035 | |
| Journal Diameter | 1.9982-1.9990 | Valve Spring Force (lb) | 132 at 1.505" | |
| Shell Diameter | 1.9992-2.0010 | wear limit-110 | | |

H = Horizontal, I = Intake, E = Exhaust
 V = Vertical, F = Forward, B = Back
 * - Measurements are in mm

ENGINE COMPONENTS MEASUREMENTS
FT. LEWIS, WA
ENGINE TYPE: JEEP, 4 CYLINDER, 140 CID
ENGINE NUMBER: 235875 TYPE FUEL: GASOHOL

| Component | Cylinder No. | | | |
|--------------------------------|-------------------|--------|--------|--------|
| | 1 | 2 | 3 | 4 |
| Compression Ring Gaps | | | | |
| Top | 1.32 ⁺ | 1.42 | 1.40 | 1.37 |
| Bottom | 1.83 | 2.01 | 1.52 | 1.63 |
| Cylinder Bore Diameter | | | | |
| Top | 98.468 | 98.489 | 98.471 | 98.476 |
| Middle | 98.455 | 98.471 | 98.463 | 98.476 |
| Bottom | 98.443 | 98.458 | 98.455 | 98.458 |
| Out-of-round | 0.021 | 0.030 | 0.028 | 0.035 |
| Taper | 0.025 | 0.036 | 0.016 | 0.018 |
| Connecting Rod Bearings | | | | |
| Journal Diameter | | | | |
| Shell Diameter | | | | |
| Crankshaft Lobe Lift | | | | |
| Valve Stem to Guide Clearance | | | | |
| Valve Spring Force (N-m) | | | | |
| Piston Avg. Diameter | | | | |
| Middle and bottom of skirt | | | | |
| Main Bearings | | | | |
| Journal Diameter | | | | |
| Shell Diameter | | | | |
| Compression Ring Gaps | | | | |
| Top | 0.25-0.69 | | | |
| Bottom | 98.433-98.494 | | | |
| Cylinder Bore Diameter | 0.13 max | | | |
| Out-of-round | 0.20 max | | | |
| Taper | 50.754-50.775 | | | |
| Connecting Rod Bearings | 50.780-50.825 | | | |
| Journal Diameter | | | | |
| Shell Diameter | | | | |

H = Horizontal, T = Transverse, N = Normal, V = Vertical,
 F = Forward, B = Back, I = Intake, E = Exhaust
 + = Measurements are in mm

Manufacturer's Service Limits, mm

| | | | | |
|-------------------------------|-----------------|--|--|--|
| Compression Ring Gaps | | | | |
| Top | 0.25-0.69 | | | |
| Bottom | 98.433-98.494 | | | |
| Cylinder Bore Diameter | 0.13 max | | | |
| Out-of-round | 0.20 max | | | |
| Taper | 50.754-50.775 | | | |
| Connecting Rod Bearings | 50.780-50.825 | | | |
| Journal Diameter | | | | |
| Shell Diameter | | | | |
| Crankshaft Lobe Lift | | | | |
| Intake | 6.017 | | | |
| Exhaust | 5.918 | | | |
| Valve Stem to Guide Clearance | | | | |
| Intake | 0.025-0.064 | | | |
| Exhaust | 0.025-0.089 | | | |
| Valve Spring Force (N-m) | 567 at 38.23 mm | | | |
| | Wear limit 489 | | | |
| Piston Diameter | | | | |
| Main Bearings | | | | |
| Journal Diameter | | | | |
| Shell Diameter | | | | |

ENGINE COMPONENTS MEASUREMENTS
FT. LEWIS, WA
ENGINE TYPE: CHRYSLER V-8, 318 CID
ENGINE NUMBER: 6M318-01212997 TYPE FUEL: UNLEADED GASOLINE

| Component | Cylinder No. | | | | | | | |
|--|---------------|--------|--------|--------|--------|--------|--------|--------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Compression Ring Gaps | | | | | | | | |
| Top | 0.032 | 0.030 | 0.030 | 0.030 | 0.023 | 0.032 | 0.025 | 0.025 |
| Bottom | 0.034 | 0.032 | 0.028 | 0.026 | 0.022 | 0.026 | 0.027 | 0.030 |
| Cylinder Bore Diameter | | | | | | | | |
| Top | 3.9109 | 3.9107 | 3.9113 | 3.9108 | 3.9105 | 3.9107 | 3.9104 | 3.9109 |
| Middle | 3.9103 | 3.9103 | 3.9103 | 3.9104 | 3.9107 | 3.9104 | 3.9104 | 3.9104 |
| Bottom | 3.9103 | 3.9106 | 3.9102 | 3.9101 | 3.9102 | 3.9102 | 3.9102 | 3.9101 |
| Out-of-round | 0.0002 | 0.0005 | 0.0002 | 0.0004 | 0.0008 | 0.0008 | 0.0013 | 0.0004 |
| Taper | 0.0006 | 0.0011 | 0.0004 | 0.0002 | 0.0004 | 0.0001 | 0.0005 | 0.0003 |
| Connecting Rod Bearings | | | | | | | | |
| Journal Diameter | 2.1241 | 2.1240 | 2.1243 | 2.1243 | 2.1243 | 2.1242 | 2.1242 | 2.1242 |
| Shell Diameter | 2.1255 | 2.1263 | 2.1250 | 2.1257 | 2.1261 | 2.1254 | 2.1264 | 2.1258 |
| Camshaft Lobe Lift | | | | | | | | |
| Intake | 0.244 | 0.259 | 0.229 | 0.261 | 0.233 | 0.264 | 0.242 | 0.249 |
| Exhaust | 0.0053 | 0.0067 | 0.0063 | 0.0077 | 0.0037 | 0.0070 | 0.0058 | 0.0070 |
| Valve Spring Force (lb) | 162 | 110 | 157 | 114 | 156 | 112 | 158 | 111 |
| Piston Avg. Diameter Middle & Bottom of skirt | 3.9098 | 3.9093 | 3.9092 | 3.9093 | 3.9099 | 3.9092 | 3.9098 | 3.9095 |
| Main Bearings | | | | | | | | |
| Journal Diameter | 2.4996 | 2.4994 | 2.4992 | 2.4993 | 2.4994 | 2.4996 | 2.4997 | 2.4995 |
| Shell Diameter | 2.5027 | 2.5024 | 2.5019 | 2.5021 | 2.5039 | 2.5041 | 2.5016 | 2.5029 |
| Compression Ring Gaps | | | | | | | | |
| Top | 0.010-0.020 | | | | | | | |
| Bottom | 3.9100-3.9120 | | | | | | | |
| Cylinder Bore Diameter | 0.0050 max | | | | | | | |
| Out-of-round | 0.010 max | | | | | | | |
| Taper | 2.1240-2.1250 | | | | | | | |
| Connecting Rod Bearings | 2.1245-2.1275 | | | | | | | |
| Journal Diameter | | | | | | | | |
| Shell Diameter | | | | | | | | |

L = Longitudinal, T = Transverse, H = Horizontal, V = Vertical,
 F = Forward, B = Back, I = Intake, E = Exhaust
 * = Measurements are in mm

Manufacturer's Service Limits, Inches

| | | | |
|-------------------------------|----------------------|-----------------------|-------------|
| Camshaft Lobe Lift | 0.249 | 0.267 | 0.001-0.017 |
| Intake | | | |
| Exhaust | | | |
| Valve Stem to Guide Clearance | | | |
| Intake | | | |
| Exhaust | | | |
| Valve Spring Force (lb) | 78-88 lb at 1-11/16" | 170-184 lb at 1-5/16" | |
| Piston Diameter | 3.9085-3.911 | | |
| Main Bearings | | | |
| Journal Diameter | 2.4995-2.500 | | |
| Shell Diameter | 2.5000-2.503 | | |

ENGINE COMPONENTS MEASUREMENTS

FT. LEWIS, WA

ENGINE TYPE: CHRYSLER V-8, 318 CID

ENGINE NUMBER: 6M318-01212997 TYPE FUEL: UNLEADED GASOLINE

| Component | Cylinder No. | | | | | | | |
|---|---------------|--------|--------|--------|--------|--------|--------|--------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Compression Ring Caps | | | | | | | | |
| Top | 0.81 | 0.76 | 0.76 | 0.76 | 0.58 | 0.81 | 0.64 | 0.64 |
| Bottom | 0.86 | 0.81 | 0.71 | 0.66 | 0.56 | 0.66 | 0.69 | 0.76 |
| Cylinder Bore Diameter | | | | | | | | |
| Top | 99.337 | 99.332 | 99.334 | 99.334 | 99.329 | 99.317 | 99.327 | 99.360 |
| Middle | 99.322 | 99.327 | 99.332 | 99.324 | 99.319 | 99.324 | 99.319 | 99.352 |
| Bottom | 99.322 | 99.329 | 99.332 | 99.319 | 99.319 | 99.314 | 99.314 | 99.317 |
| Out-of-round | 0.005 | 0.013 | 0.005 | 0.010 | 0.021 | 0.020 | 0.033 | 0.010 |
| Taper | 0.015 | 0.028 | 0.010 | 0.005 | 0.010 | 0.003 | 0.013 | 0.008 |
| Connecting Rod Bearings | | | | | | | | |
| Journal Diameter | | | | | | | | |
| H | 53.952 | 53.950 | 53.957 | 53.957 | 53.955 | 53.955 | 53.955 | 53.955 |
| V | 53.952 | 53.950 | 53.957 | 53.957 | 53.955 | 53.955 | 53.955 | 53.955 |
| F | 53.952 | 53.950 | 53.957 | 53.957 | 53.955 | 53.955 | 53.955 | 53.955 |
| Shell Diameter | 53.968 | 54.008 | 53.975 | 54.016 | 53.985 | 53.990 | 54.005 | 54.000 |
| F | 53.968 | 54.008 | 53.975 | 54.016 | 53.985 | 53.990 | 54.005 | 54.000 |
| V | 53.968 | 54.008 | 53.975 | 54.016 | 53.985 | 53.990 | 54.005 | 54.000 |
| B | 53.968 | 54.008 | 53.975 | 54.016 | 53.985 | 53.990 | 54.005 | 54.000 |
| Camshaft Lobe Lift | | | | | | | | |
| I | 6.20 | 6.38 | 5.82 | 6.63 | 5.92 | 6.71 | 6.15 | 6.25 |
| E | 6.20 | 6.38 | 5.82 | 6.63 | 5.92 | 6.71 | 6.15 | 6.25 |
| I | 6.20 | 6.38 | 5.82 | 6.63 | 5.92 | 6.71 | 6.15 | 6.25 |
| V | 6.20 | 6.38 | 5.82 | 6.63 | 5.92 | 6.71 | 6.15 | 6.25 |
| F | 6.20 | 6.38 | 5.82 | 6.63 | 5.92 | 6.71 | 6.15 | 6.25 |
| B | 6.20 | 6.38 | 5.82 | 6.63 | 5.92 | 6.71 | 6.15 | 6.25 |
| Valve Stem to Guide Clearance | | | | | | | | |
| I | 0.135 | 0.170 | 0.160 | 0.196 | 0.094 | 0.178 | 0.147 | 0.137 |
| E | 0.135 | 0.170 | 0.160 | 0.196 | 0.094 | 0.178 | 0.147 | 0.137 |
| V | 0.135 | 0.170 | 0.160 | 0.196 | 0.094 | 0.178 | 0.147 | 0.137 |
| F | 0.135 | 0.170 | 0.160 | 0.196 | 0.094 | 0.178 | 0.147 | 0.137 |
| B | 0.135 | 0.170 | 0.160 | 0.196 | 0.094 | 0.178 | 0.147 | 0.137 |
| Valve Spring Force (N-m) | | | | | | | | |
| I | 721 | 789 | 698 | 507 | 694 | 498 | 703 | 498 |
| E | 721 | 789 | 698 | 507 | 694 | 498 | 703 | 498 |
| V | 721 | 789 | 698 | 507 | 694 | 498 | 703 | 498 |
| F | 721 | 789 | 698 | 507 | 694 | 498 | 703 | 498 |
| B | 721 | 789 | 698 | 507 | 694 | 498 | 703 | 498 |
| Piston Avg. Diameter Middle & Bottom of skirt | | | | | | | | |
| I | 99.309 | 99.296 | 99.294 | 99.296 | 99.311 | 99.294 | 99.309 | 99.301 |
| E | 99.309 | 99.296 | 99.294 | 99.296 | 99.311 | 99.294 | 99.309 | 99.301 |
| V | 99.309 | 99.296 | 99.294 | 99.296 | 99.311 | 99.294 | 99.309 | 99.301 |
| F | 99.309 | 99.296 | 99.294 | 99.296 | 99.311 | 99.294 | 99.309 | 99.301 |
| B | 99.309 | 99.296 | 99.294 | 99.296 | 99.311 | 99.294 | 99.309 | 99.301 |
| Main Bearings | | | | | | | | |
| Journal Diameter | | | | | | | | |
| H | 63.490 | 63.485 | 63.480 | 63.482 | 63.485 | 63.490 | 63.492 | 63.487 |
| V | 63.490 | 63.485 | 63.480 | 63.482 | 63.485 | 63.490 | 63.492 | 63.487 |
| F | 63.490 | 63.485 | 63.480 | 63.482 | 63.485 | 63.490 | 63.492 | 63.487 |
| B | 63.490 | 63.485 | 63.480 | 63.482 | 63.485 | 63.490 | 63.492 | 63.487 |
| Shell Diameter | 63.569 | 63.561 | 63.548 | 63.553 | 63.559 | 63.604 | 63.551 | 63.574 |
| F | 63.569 | 63.561 | 63.548 | 63.553 | 63.559 | 63.604 | 63.551 | 63.574 |
| V | 63.569 | 63.561 | 63.548 | 63.553 | 63.559 | 63.604 | 63.551 | 63.574 |
| B | 63.569 | 63.561 | 63.548 | 63.553 | 63.559 | 63.604 | 63.551 | 63.574 |
| Compression Ring Caps | | | | | | | | |
| Top | 0.25-0.51 | | | | | | | |
| Bottom | 0.25-0.51 | | | | | | | |
| Cylinder Bore Diameter | | | | | | | | |
| Out-of-round | 99.314-99.365 | | | | | | | |
| Taper | 0.13 max | | | | | | | |
| 0.25 max | 0.25 max | | | | | | | |
| Connecting Rod Bearings | | | | | | | | |
| Journal Diameter | 53.950-53.975 | | | | | | | |
| Shell Diameter | 53.962-54.039 | | | | | | | |
| F | 53.950-53.975 | | | | | | | |
| V | 53.950-53.975 | | | | | | | |
| B | 53.950-53.975 | | | | | | | |
| I | 53.950-53.975 | | | | | | | |
| E | 53.950-53.975 | | | | | | | |
| F | 53.950-53.975 | | | | | | | |
| V | 53.950-53.975 | | | | | | | |
| B | 53.950-53.975 | | | | | | | |
| I | 53.950-53.975 | | | | | | | |
| E | 53.950-53.975 | | | | | | | |
| F | 53.950-53.975 | | | | | | | |
| V | 53.950-53.975 | | | | | | | |
| B | 53.950-53.975 | | | | | | | |
| I | 53.950-53.975 | | | | | | | |
| E | 53.950-53.975 | | | | | | | |
| F | 53.950-53.975 | | | | | | | |
| V | 53.950-53.975 | | | | | | | |
| B | 53.950-53.975 | | | | | | | |
| I | 53.950-53.975 | | | | | | | |
| E | 53.950-53.975 | | | | | | | |
| F | 53.950-53.975 | | | | | | | |
| V | 53.950-53.975 | | | | | | | |
| B | 53.950-53.975 | | | | | | | |
| I | 53.950-53.975 | | | | | | | |
| E | 53.950-53.975 | | | | | | | |
| F | 53.950-53.975 | | | | | | | |
| V | 53.950-53.975 | | | | | | | |
| B | 53.950-53.975 | | | | | | | |
| I | 53.950-53.975 | | | | | | | |
| E | 53.950-53.975 | | | | | | | |
| F | 53.950-53.975 | | | | | | | |
| V | 53.950-53.975 | | | | | | | |
| B | 53.950-53.975 | | | | | | | |
| I | 53.950-53.975 | | | | | | | |
| E | 53.950-53.975 | | | | | | | |
| F | 53.950-53.975 | | | | | | | |
| V | 53.950-53.975 | | | | | | | |
| B | 53.950-53.975 | | | | | | | |
| I | 53.950-53.975 | | | | | | | |
| E | 53.950-53.975 | | | | | | | |
| F | 53.950-53.975 | | | | | | | |
| V | 53.950-53.975 | | | | | | | |
| B | 53.950-53.975 | | | | | | | |
| I | 53.950-53.975 | | | | | | | |
| E | 53.950-53.975 | | | | | | | |
| F | 53.950-53.975 | | | | | | | |
| V | 53.950-53.975 | | | | | | | |
| B | 53.950-53.975 | | | | | | | |
| I | 53.950-53.975 | | | | | | | |
| E | 53.950-53.975 | | | | | | | |
| F | 53.950-53.975 | | | | | | | |
| V | 53.950-53.975 | | | | | | | |
| B | 53.950-53.975 | | | | | | | |
| I | 53.950-53.975 | | | | | | | |
| E | 53.950-53.975 | | | | | | | |
| F | 53.950-53.975 | | | | | | | |
| V | 53.950-53.975 | | | | | | | |
| B | 53.950-53.975 | | | | | | | |
| I | 53.950-53.975 | | | | | | | |
| E | 53.950-53.975 | | | | | | | |
| F | 53.950-53.975 | | | | | | | |
| V | 53.950-53.975 | | | | | | | |
| B | 53.950-53.975 | | | | | | | |
| I | 53.950-53.975 | | | | | | | |
| E | 53.950-53.975 | | | | | | | |
| F | 53.950-53.975 | | | | | | | |
| V | 53.950-53.975 | | | | | | | |
| B | 53.950-53.975 | | | | | | | |
| I | 53.950-53.975 | | | | | | | |
| E | 53.950-53.975 | | | | | | | |
| F | 53.950-53.975 | | | | | | | |
| V | 53.950-53.975 | | | | | | | |
| B | 53.950-53.975 | | | | | | | |
| I | 53.950-53.975 | | | | | | | |
| E | 53.950-53.975 | | | | | | | |
| F | 53.950-53.975 | | | | | | | |
| V | 53.950-53.975 | | | | | | | |
| B | 53.950-53.975 | | | | | | | |
| I | 53.950-53.975 | | | | | | | |
| E | 53.950-53.975 | | | | | | | |
| F | 53.950-53.975 | | | | | | | |
| V | 53.950-53.975 | | | | | | | |
| B | 53.950-53.975 | | | | | | | |
| I | 53.950-53.975 | | | | | | | |
| E | 53.950-53.975 | | | | | | | |
| F | 53.950-53.975 | | | | | | | |
| V | 53.950-53.975 | | | | | | | |
| B | 53.950-53.975 | | | | | | | |
| I | 53.950-53.975 | | | | | | | |
| E | 53.950-53.975 | | | | | | | |
| F | 53.950-53.975 | | | | | | | |
| V | 53.950-53.975 | | | | | | | |
| B | 53.950-53.975 | | | | | | | |
| I | 53.950-53.975 | | | | | | | |
| E | 53.950-53.975 | | | | | | | |
| F | 53.950-53.975 | | | | | | | |
| V | 53.950-53.975 | | | | | | | |
| B | 53.950-53.975 | | | | | | | |
| I | 53.950-53.975 | | | | | | | |
| E | 53.950-53.975 | | | | | | | |
| F | 53.950-53.975 | | | | | | | |
| V | 53.950-53.975 | | | | | | | |
| B | 53.950-53.975 | | | | | | | |
| I | 53.950-53.975 | | | | | | | |
| E | 53.950-53.975 | | | | | | | |
| F | 53.950-53.975 | | | | | | | |
| V | 53.950-53.975 | | | | | | | |
| B | 53.950-53.975 | | | | | | | |
| I | 53.950-53.975 | | | | | | | |

ENGINE COMPONENTS MEASUREMENTS

FT. LEWIS, WA

ENGINE TYPE: CHRYSLER V-8, 318 CID

ENGINE NUMBER: 6M318-02260516 TYPE FUEL: GASOHOL

| Component | Cylinder No. | | | | | | | |
|---|---------------|--------|--------|--------|--------|--------|--------|--------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Compression Ring Gaps | | | | | | | | |
| Top | 0.028 | 0.035 | 0.032 | 0.030 | 0.030 | Broken | 0.030 | 0.028 |
| Bottom | 0.030 | 0.033 | 0.032 | 0.030 | 0.031 | Broken | 0.034 | 0.031 |
| Cylinder Bore Diameter | | | | | | | | |
| Top | 3.9118 | 3.9114 | 3.9120 | 3.9118 | 3.9120 | 3.9120 | 3.9123 | 3.9116 |
| Middle | 3.9111 | 3.9108 | 3.9111 | 3.9115 | 3.9106 | 3.9122 | 3.9122 | 3.9112 |
| Bottom | 3.9111 | 3.9108 | 3.9111 | 3.9114 | 3.9111 | 3.9117 | 3.9113 | 3.9112 |
| Out-of-round | 0.0004 | 0.0002 | 0.0010 | 0.0011 | 0.0009 | 0.0014 | 0.0006 | 0.0001 |
| Taper | 0.0007 | 0.0009 | 0.0001 | 0.0001 | 0.0000 | 0.0005 | 0.0007 | 0.0003 |
| Connecting Rod Bearings | | | | | | | | |
| Journal Diameter | 2.1242 | 2.1211 | 2.1240 | 2.1240 | 2.1238 | 2.1238 | 2.1241 | 2.1241 |
| Shell Diameter | 2.1262 | 2.1268 | 2.1266 | 2.1265 | 2.1258 | 2.1259 | 2.1267 | 2.1265 |
| Camshaft Lobe Lift | | | | | | | | |
| Intake | 0.247 | 0.236 | 0.246 | 0.231 | 0.246 | 0.221 | 0.262 | 0.261 |
| Exhaust | 0.0052 | 0.0063 | 0.0057 | 0.0068 | 0.0061 | 0.0059 | 0.0068 | 0.0066 |
| Valve Stem to Guide Clearance | | | | | | | | |
| Intake | 165 | 116 | 163 | 116 | 163 | 114 | 163 | 113 |
| Exhaust | 165 | 116 | 163 | 116 | 163 | 114 | 163 | 113 |
| Piston Avg. Diameter Middle & bottom of skirt | 3.9080 | 3.9082 | 3.9070 | 3.9079 | 3.9075 | 3.9061 | 3.9084 | 3.9061 |
| Main Bearings | | | | | | | | |
| Journal Diameter | 2.4998 | 2.4997 | 2.5000 | 2.4998 | 2.5000 | 2.4999 | 2.5000 | 2.4996 |
| Shell Diameter | 2.5022 | 2.5025 | 2.5021 | 2.5018 | 2.5023 | 2.5025 | 2.5023 | 2.5028 |
| Compression Ring Gaps | | | | | | | | |
| Top | 0.010-0.020 | | | | | | | |
| Bottom | 0.010-0.020 | | | | | | | |
| Cylinder Bore Diameter | 3.9100-3.9120 | | | | | | | |
| Out-of-round | 0.0050 max | | | | | | | |
| Taper | 0.010 max | | | | | | | |
| Connecting Rod Bearings | | | | | | | | |
| Journal Diameter | 2.1240-2.1250 | | | | | | | |
| Shell Diameter | 2.1245-2.1275 | | | | | | | |

Manufacturer's Service Limits, Inches

Camshaft Lobe Lift
Intake 0.249
Exhaust 0.267
Valve Stem to Guide Clearance
Intake 0.001-0.017
Exhaust 0.001-0.017
Valve Spring Force (lb) 78-88 lb at 1-1/16"
170-184 lb at 1-5/16"

Piston Diameter
Main Bearings 3.9085-3.9115
Journal Diameter 2.4995-2.5005
Shell Diameter 2.5000-2.5030

Me - Longitudinal, T - Transverse, H - Horizontal, V - Vertical,
F - Forward, B - Back, I - Intake, E - Exhaust
* - Measurements are in mm

ENGINE COMPONENTS MEASUREMENTS
FT. LEWIS, WA
ENGINE TYPE: CHRYSLER V-8, 318 CID
ENGINE NUMBER: 6M318-02260516 TYPE FUEL: GASOHOL

| Component | Cylinder No. | | | | | | | |
|--|---------------------|--------|--------|--------|--------|--------|--------|--------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Compression Ring | | | | | | | | |
| Gaps | | | | | | | | |
| Top | 0.71* | 0.89 | 0.81 | 0.76 | 0.76 | Broken | 0.76 | 0.71 |
| Bottom | 0.76 | 0.84 | 0.81 | 0.76 | 0.84 | Broken | 0.86 | 0.79 |
| Cylinder Bore | | | | | | | | |
| Diameter | | | | | | | | |
| Top | 99.360 | 99.350 | 99.365 | 99.360 | 99.339 | 99.365 | 99.370 | 99.337 |
| Middle | 99.342 | 99.334 | 99.342 | 99.352 | 99.329 | 99.355 | 99.370 | 99.332 |
| Bottom | 99.342 | 99.334 | 99.342 | 99.350 | 99.342 | 99.344 | 99.337 | 99.344 |
| Out-of-round | 0.010 | 0.005 | 0.026 | 0.028 | 0.023 | 0.036 | 0.015 | 0.003 |
| Taper | 0.018 | 0.023 | 0.003 | 0.003 | 0.000 | 0.013 | 0.018 | 0.008 |
| Connecting Rod | | | | | | | | |
| Bearings | | | | | | | | |
| Journal Diameter | | | | | | | | |
| H | 53.955 | 53.876 | 53.950 | 53.945 | 53.947 | 53.950 | 53.952 | 53.952 |
| V | 53.955 | 53.876 | 53.950 | 53.945 | 53.947 | 53.950 | 53.952 | 53.952 |
| F | 54.005 | 54.021 | 54.016 | 54.013 | 53.995 | 54.018 | 54.013 | 54.011 |
| B | 54.005 | 54.021 | 54.016 | 54.013 | 53.995 | 54.018 | 54.013 | 54.011 |
| Shell Diameter | | | | | | | | |
| H | 53.955 | 53.876 | 53.950 | 53.945 | 53.947 | 53.950 | 53.952 | 53.952 |
| V | 53.955 | 53.876 | 53.950 | 53.945 | 53.947 | 53.950 | 53.952 | 53.952 |
| F | 54.005 | 54.021 | 54.016 | 54.013 | 53.995 | 54.018 | 54.013 | 54.011 |
| B | 54.005 | 54.021 | 54.016 | 54.013 | 53.995 | 54.018 | 54.013 | 54.011 |
| Camshaft Lobe | | | | | | | | |
| Lift | | | | | | | | |
| I | 6.27 | 6.50 | 6.25 | 6.38 | 6.25 | 6.60 | 6.71 | 6.10 |
| E | 6.27 | 6.50 | 6.25 | 6.38 | 6.25 | 6.60 | 6.71 | 6.10 |
| V | 6.27 | 6.50 | 6.25 | 6.38 | 6.25 | 6.60 | 6.71 | 6.10 |
| H | 6.27 | 6.50 | 6.25 | 6.38 | 6.25 | 6.60 | 6.71 | 6.10 |
| F | 6.27 | 6.50 | 6.25 | 6.38 | 6.25 | 6.60 | 6.71 | 6.10 |
| B | 6.27 | 6.50 | 6.25 | 6.38 | 6.25 | 6.60 | 6.71 | 6.10 |
| Valve Stem to Guide Clearance | | | | | | | | |
| I | 0.132 | 0.160 | 0.145 | 0.173 | 0.155 | 0.150 | 0.142 | 0.168 |
| E | 0.132 | 0.160 | 0.145 | 0.173 | 0.155 | 0.150 | 0.142 | 0.168 |
| V | 0.132 | 0.160 | 0.145 | 0.173 | 0.155 | 0.150 | 0.142 | 0.168 |
| H | 0.132 | 0.160 | 0.145 | 0.173 | 0.155 | 0.150 | 0.142 | 0.168 |
| F | 0.132 | 0.160 | 0.145 | 0.173 | 0.155 | 0.150 | 0.142 | 0.168 |
| B | 0.132 | 0.160 | 0.145 | 0.173 | 0.155 | 0.150 | 0.142 | 0.168 |
| Valve Spring Force (N-m) | | | | | | | | |
| I | 734 | 516 | 725 | 516 | 725 | 507 | 734 | 516 |
| E | 734 | 516 | 725 | 516 | 725 | 507 | 734 | 516 |
| V | 734 | 516 | 725 | 516 | 725 | 507 | 734 | 516 |
| H | 734 | 516 | 725 | 516 | 725 | 507 | 734 | 516 |
| F | 734 | 516 | 725 | 516 | 725 | 507 | 734 | 516 |
| B | 734 | 516 | 725 | 516 | 725 | 507 | 734 | 516 |
| Piston Avg. Diameter Middle & bottom of skirt | | | | | | | | |
| I | 99.263 | 99.268 | 99.238 | 99.261 | 99.251 | 99.215 | 99.273 | 99.215 |
| E | 99.263 | 99.268 | 99.238 | 99.261 | 99.251 | 99.215 | 99.273 | 99.215 |
| V | 99.263 | 99.268 | 99.238 | 99.261 | 99.251 | 99.215 | 99.273 | 99.215 |
| H | 99.263 | 99.268 | 99.238 | 99.261 | 99.251 | 99.215 | 99.273 | 99.215 |
| F | 99.263 | 99.268 | 99.238 | 99.261 | 99.251 | 99.215 | 99.273 | 99.215 |
| B | 99.263 | 99.268 | 99.238 | 99.261 | 99.251 | 99.215 | 99.273 | 99.215 |
| Main Bearings | | | | | | | | |
| Journal Diameter | | | | | | | | |
| H | 63.495 | 63.492 | 63.500 | 63.495 | 63.500 | 63.497 | 63.490 | 63.490 |
| V | 63.495 | 63.492 | 63.500 | 63.495 | 63.500 | 63.497 | 63.490 | 63.490 |
| F | 63.556 | 63.564 | 63.553 | 63.546 | 63.558 | 63.564 | 63.538 | 63.571 |
| B | 63.556 | 63.564 | 63.553 | 63.546 | 63.558 | 63.564 | 63.538 | 63.571 |
| Shell Diameter | | | | | | | | |
| H | 63.495 | 63.492 | 63.500 | 63.495 | 63.500 | 63.497 | 63.490 | 63.490 |
| V | 63.495 | 63.492 | 63.500 | 63.495 | 63.500 | 63.497 | 63.490 | 63.490 |
| F | 63.556 | 63.564 | 63.553 | 63.546 | 63.558 | 63.564 | 63.538 | 63.571 |
| B | 63.556 | 63.564 | 63.553 | 63.546 | 63.558 | 63.564 | 63.538 | 63.571 |
| Compression Ring Gaps | | | | | | | | |
| Top | 0.25-0.51 | | | | | | | |
| Bottom | 0.25-0.51 | | | | | | | |
| Cylinder Bore Diameter | | | | | | | | |
| I | 99.314-99.365 | | | | | | | |
| E | 99.314-99.365 | | | | | | | |
| V | 99.314-99.365 | | | | | | | |
| H | 99.314-99.365 | | | | | | | |
| F | 99.314-99.365 | | | | | | | |
| B | 99.314-99.365 | | | | | | | |
| Out-of-round | | | | | | | | |
| I | 0.13 max | | | | | | | |
| E | 0.13 max | | | | | | | |
| V | 0.13 max | | | | | | | |
| H | 0.13 max | | | | | | | |
| F | 0.13 max | | | | | | | |
| B | 0.13 max | | | | | | | |
| Connecting Rod Bearings | | | | | | | | |
| Journal Diameter | | | | | | | | |
| H | 53.950-53.975 | | | | | | | |
| V | 53.950-53.975 | | | | | | | |
| F | 53.950-53.975 | | | | | | | |
| B | 53.950-53.975 | | | | | | | |
| Shell Diameter | | | | | | | | |
| H | 53.950-53.975 | | | | | | | |
| V | 53.950-53.975 | | | | | | | |
| F | 53.950-53.975 | | | | | | | |
| B | 53.950-53.975 | | | | | | | |
| Manufacturer's Service Limits, mm | | | | | | | | |
| Camshaft Lobe Lift | | | | | | | | |
| Intake | 6.325 | | | | | | | |
| Exhaust | 6.782 | | | | | | | |
| Valve Stem to Guide Clearance | | | | | | | | |
| Intake | 0.03-0.43 | | | | | | | |
| Exhaust | 0.03-0.43 | | | | | | | |
| Valve Spring Force (N-m) | | | | | | | | |
| I | 347-391 at 42.86 mm | | | | | | | |
| E | 347-391 at 42.86 mm | | | | | | | |
| V | 347-391 at 42.86 mm | | | | | | | |
| H | 347-391 at 42.86 mm | | | | | | | |
| F | 347-391 at 42.86 mm | | | | | | | |
| B | 347-391 at 42.86 mm | | | | | | | |
| Piston Diameter | | | | | | | | |
| Main Bearings | 99.276-99.352 | | | | | | | |
| Journal Diameter | 63.487-63.513 | | | | | | | |
| Shell Diameter | 63.500-63.576 | | | | | | | |

* = Longitudinal, T = Transverse, H = Horizontal, V = Vertical,
 F = Forward, B = Back, I = Intake, E = Exhaust
 * = Measurements are in mm

ENGINE COMPONENTS MEASUREMENTS

FT. LEWIS, WA

ENGINE TYPE: CHRYSLER V-8, 318 CID

ENGINE NUMBER: 6M318-12110971 TYPE FUEL: GASOHOL

| Component | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---------------------------------------|----------------------|--------|--------|--------|--------|--------|--------|--------|
| Cylinder No. | | | | | | | | |
| Compression Ring | | | | | | | | |
| Gaps | | | | | | | | |
| Top | 0.032 | 0.035 | 0.038 | 0.034 | 0.034 | 0.032 | 0.035 | 0.030 |
| Bottom | 0.031 | 0.033 | 0.036 | 0.036 | 0.032 | 0.035 | 0.033 | 0.033 |
| Cylinder Bore | | | | | | | | |
| Diameter | | | | | | | | |
| Top | 3.9117 | 3.9110 | 3.9124 | 3.9122 | 3.9122 | 3.9124 | 3.9117 | 3.9110 |
| Middle | 3.9116 | 3.9114 | 3.9122 | 3.9125 | 3.9125 | 3.9125 | 3.9121 | 3.9112 |
| Bottom | 3.9111 | 3.9113 | 3.9120 | 3.9124 | 3.9124 | 3.9124 | 3.9114 | 3.9109 |
| Out-of-round | 0.0007 | 0.0002 | 0.0004 | 0.0007 | 0.0006 | 0.0009 | 0.0002 | 0.0004 |
| Taper | 0.0006 | 0.0004 | 0.0002 | 0.0001 | 0.0002 | 0.0001 | 0.0005 | 0.0005 |
| Connecting Rod | | | | | | | | |
| Bearings | | | | | | | | |
| Journal Diameter | 2.1242 | 2.1242 | 2.1242 | 2.1242 | 2.1242 | 2.1242 | 2.1243 | 2.1243 |
| Shell Diameter | 2.1285 | 2.1284 | 2.1268 | 2.1269 | 2.1254 | 2.1262 | 2.1259 | 2.1262 |
| Camshaft Lobe | | | | | | | | |
| Lift | 0.249 | 0.264 | 0.237 | 0.231 | 0.244 | 0.250 | 0.241 | 0.252 |
| Valve Stem to Guide Clearance | 0.0067 | 0.0080 | 0.0066 | 0.0067 | 0.0078 | 0.0078 | 0.0053 | 0.0082 |
| Valve Spring Force (lb) | 158 | 112 | 157 | 110 | 157 | 113 | 154 | 110 |
| Platton Arg. Diameter | 3.9091 | 3.9094 | 3.9092 | 3.9090 | 3.9101 | 3.9089 | 3.9089 | 3.9091 |
| Middle & bottom of skirt | | | | | | | | |
| Main Bearings | | | | | | | | |
| Journal Diameter | 2.4994 | 2.4995 | 2.4997 | 2.4996 | 2.4998 | 2.4998 | 2.4998 | 2.4997 |
| Shell Diameter | 2.5022 | 2.5025 | 2.5018 | 2.5015 | 2.5028 | 2.5025 | 2.5024 | 2.5025 |
| Manufacturer's Service Limits, Inches | | | | | | | | |
| Compression Ring Gaps | | | | | | | | |
| Top | 0.010-0.020 | | | | | | | |
| Bottom | | | | | | | | |
| Cylinder Bore Diameter | 3.9100-3.9120 | | | | | | | |
| Out-of-round | 0.0050 max | | | | | | | |
| Taper | 0.010 max | | | | | | | |
| Connecting Rod Bearings | | | | | | | | |
| Journal Diameter | 2.1240-2.1250 | | | | | | | |
| Shell Diameter | 2.1245-2.1275 | | | | | | | |
| Camshaft Lobe Lift | | | | | | | | |
| Intake | 0.249 | | | | | | | |
| Exhaust | 0.267 | | | | | | | |
| Valve Stem to Guide Clearance | 0.001-0.017 | | | | | | | |
| Intake | | | | | | | | |
| Exhaust | | | | | | | | |
| Valve Spring Force (lb) | 70-88 lb at 1-11/16" | | | | | | | |
| 170-184 lb at 1-5/16" | | | | | | | | |
| Platton Diameter | | | | | | | | |
| Main Bearings | 3.9085-3.911 | | | | | | | |
| Journal Diameter | 2.4995-2.500 | | | | | | | |
| Shell Diameter | 2.5000-2.503 | | | | | | | |

H = Longitudinal, T = Transverse, H = Horizontal, V = Vertical.
 F = Forward, B = Back, I = Intake, E = Exhaust
 * = Measurements are in mm

ENGINE COMPONENTS MEASUREMENTS
FT. LEWIS, WA
ENGINE TYPE: CHRYSLER V-8, 318 CID
ENGINE NUMBER: 6M318-12110971 TYPE FUEL: GASOLIN

| Component | Cylinder No. | | | | | | | |
|--|---------------------|--------|--------|--------|--------|--------|--------|--------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Compression Ring | | | | | | | | |
| Cape | | | | | | | | |
| Top | 0.81* | 0.89 | 0.97 | 0.86 | 0.86 | 0.81 | 0.89 | 0.76 |
| Bottom | 0.79 | 0.84 | 0.91 | 0.91 | 0.81 | 0.89 | 0.84 | 0.84 |
| Cylinder Bore | | | | | | | | |
| Diameter | | | | | | | | |
| Top | 99.357 | 99.339 | 99.370 | 99.411 | 99.421 | 99.378 | 99.357 | 99.362 |
| Middle | 99.355 | 99.350 | 99.378 | 99.405 | 99.418 | 99.357 | 99.380 | 99.372 |
| Bottom | 99.342 | 99.347 | 99.365 | 99.375 | 99.405 | 99.413 | 99.352 | 99.370 |
| Out-of-round | 0.018 | 0.005 | 0.010 | 0.018 | 0.015 | 0.015 | 0.023 | 0.005 |
| Taper | 0.015 | 0.010 | 0.006 | 0.003 | 0.005 | 0.005 | 0.012 | 0.011 |
| Connecting Rod | | | | | | | | |
| Bearing | | | | | | | | |
| Journal Diameter | | | | | | | | |
| H | 53.955 | 53.955 | 53.955 | 53.955 | 53.955 | 53.955 | 53.955 | 53.957 |
| V | 53.955 | 53.955 | 53.955 | 53.955 | 53.955 | 53.955 | 53.955 | 53.957 |
| F | 54.064 | 54.061 | 54.023 | 54.023 | 54.023 | 54.005 | 54.005 | 54.005 |
| B | 54.064 | 54.061 | 54.023 | 54.023 | 54.023 | 54.005 | 54.005 | 54.005 |
| Shell Diameter | | | | | | | | |
| H | 53.955 | 53.955 | 53.955 | 53.955 | 53.955 | 53.955 | 53.955 | 53.957 |
| V | 53.955 | 53.955 | 53.955 | 53.955 | 53.955 | 53.955 | 53.955 | 53.957 |
| F | 54.064 | 54.061 | 54.023 | 54.023 | 54.023 | 54.005 | 54.005 | 54.005 |
| B | 54.064 | 54.061 | 54.023 | 54.023 | 54.023 | 54.005 | 54.005 | 54.005 |
| Camshaft Lobe | | | | | | | | |
| Lift | 6.32 | 6.71 | 6.02 | 6.38 | 6.20 | 6.35 | 6.12 | 6.43 |
| Valve Stem to Guide Clearance | | | | | | | | |
| I | 0.170 | 0.203 | 0.168 | 0.170 | 0.168 | 0.198 | 0.152 | 0.198 |
| E | 0.170 | 0.203 | 0.168 | 0.170 | 0.168 | 0.198 | 0.152 | 0.198 |
| Valve Spring Force (N-m) | | | | | | | | |
| I | 703 | 498 | 698 | 489 | 698 | 303 | 685 | 489 |
| E | 703 | 498 | 698 | 489 | 698 | 303 | 685 | 489 |
| Piston Avg. Diameter Middle & Bottom of skirt | | | | | | | | |
| 99.291 | 99.299 | 99.294 | 99.289 | 99.317 | 99.286 | 99.286 | 99.291 | 99.291 |
| Main Bearings | | | | | | | | |
| Journal Diameter | | | | | | | | |
| H | 63.485 | 63.487 | 63.492 | 63.490 | 63.495 | 63.495 | 63.495 | 63.492 |
| V | 63.485 | 63.487 | 63.492 | 63.490 | 63.495 | 63.495 | 63.495 | 63.492 |
| F | 63.556 | 63.564 | 63.546 | 63.538 | 63.571 | 63.564 | 63.525 | 63.561 |
| B | 63.556 | 63.564 | 63.546 | 63.538 | 63.571 | 63.564 | 63.525 | 63.561 |
| Compression Ring Caps | | | | | | | | |
| Top | 0.25-0.31 | | | | | | | |
| Bottom | 99.314-99.365 | | | | | | | |
| Cylinder Bore Diameter | | | | | | | | |
| Out-of-round | 0.13 max | | | | | | | |
| Taper | 0.25 max | | | | | | | |
| Connecting Rod Bearings | | | | | | | | |
| Journal Diameter | 53.950-53.975 | | | | | | | |
| Shell Diameter | 53.962-54.039 | | | | | | | |
| Camshaft Lobe Lift | | | | | | | | |
| Intake | 6.325 | | | | | | | |
| Exhaust | 6.782 | | | | | | | |
| Valve Stem to Guide Clearance | | | | | | | | |
| Intake | 0.03-0.43 | | | | | | | |
| Exhaust | 0.03-0.43 | | | | | | | |
| Valve Spring Force (N-m) | | | | | | | | |
| Intake | 347-391 at 42.86 mm | | | | | | | |
| Exhaust | 756-818 at 33.34 mm | | | | | | | |

H = Horizontal, V = Vertical,
 F = Forward, B = Back, I = Intake, E = Exhaust
 * = Measurements are in mm

ENGINE COMPONENTS MEASUREMENTS
FT. MCCOY, WI
ENGINE TYPE: AMC 6 CYLINDER, 232 CID
ENGINE NUMBER: CD0941 TYPE FUEL: UNLEADED GASOLINE

| Component | Cylinder No. | | | | | |
|---|--------------|--------|--------|--------|--------|--------|
| | 1 | 2 | 3 | 4 | 5 | 6 |
| Compression Ring | | | | | | |
| Caps | | | | | | |
| Top | 0.030 | 0.029 | 0.027 | 0.027 | 0.027 | 0.026 |
| Bottom | 0.037 | 0.034 | 0.030 | 0.034 | 0.030 | 0.040 |
| Cylinder Bore | | | | | | |
| Diameter | | | | | | |
| Top | 3.7527 | 3.7507 | 3.7515 | 3.7524 | 3.7507 | 3.7517 |
| Middle | 3.7517 | 3.7501 | 3.7515 | 3.7512 | 3.7505 | 3.7512 |
| Bottom | 3.7514 | 3.7504 | 3.7514 | 3.7510 | 3.7509 | 3.7511 |
| Out-of-round | 0.0020 | 0.0012 | 0.0017 | 0.0008 | 0.0009 | 0.0000 |
| Taper | 0.0013 | 0.0013 | 0.0014 | 0.0007 | 0.0004 | 0.0008 |
| Connecting Rod | | | | | | |
| Bearings | | | | | | |
| Journal Diameter | | | | | | |
| Shell Diameter | | | | | | |
| Camshaft Lobe Lift | | | | | | |
| Valve Stem to Guide Clearance | | | | | | |
| Valve Spring Force (lb) | | | | | | |
| Piston Avg. Diameter Middle & bottom of skirt | | | | | | |
| Main Bearings | | | | | | |
| Journal Diameter | | | | | | |
| Shell Diameter | | | | | | |
| Compression Ring Caps | | | | | | |
| Top | | | | | | |
| Bottom | | | | | | |
| Cylinder Bore Diameter | | | | | | |
| Out-of-round | | | | | | |
| Taper | | | | | | |
| Connecting Rod Bearings | | | | | | |
| Journal Diameter | | | | | | |
| Shell Diameter | | | | | | |

L = Longitudinal, T = Transverse, H = Horizontal, V = Vertical,
 F = Forward, B = Back, I = Intake, E = Exhaust
 * = Measurements are in mm

ENGINE COMPONENTS MEASUREMENTS

FT. MCCOY, WI

ENGINE TYPE: AMC 6 CYLINDER, 232 CID

ENGINE NUMBER: CD0941 TYPE FUEL: UNLEADED GASOLINE

| Component | Cylinder No. | | | | | |
|---|-------------------|----------|----------|----------|----------|----------|
| | 1 | 2 | 3 | 4 | 5 | 6 |
| Compression Ring | | | | | | |
| Cape | 0.76 ⁺ | 0.74 | 0.69 | 0.69 | 0.69 | 0.66 |
| Top | 0.94 | 0.86 | 0.76 | 0.86 | 0.76 | 1.02 |
| Bottom | | | | | | |
| Cylinder Bore | | | | | | |
| Diameter | | | | | | |
| Top | 95.319 | 95.268 | 95.311 | 95.268 | 95.293 | 95.270 |
| Middle | 95.293 | 95.253 | 95.288 | 95.263 | 95.283 | 95.273 |
| Bottom | 95.286 | 95.260 | 95.286 | 95.275 | 95.283 | 95.278 |
| Out-of-round | 0.031 | 0.031 | 0.043 | 0.020 | 0.023 | 0.000 |
| Taper | 0.033 | 0.033 | 0.036 | 0.018 | 0.010 | 0.020 |
| Connecting Rod Bearings | | | | | | |
| Journal Diameter | H 53.195 | V 53.200 | H 53.203 | V 53.200 | H 53.198 | V 53.205 |
| Shell Diameter | F 53.279 | F 53.292 | F 53.304 | F 53.307 | F 53.294 | F 53.287 |
| Camshaft Lobe Lift | I 5.87 | E 5.74 | I 5.84 | E 5.84 | I 5.82 | E 5.87 |
| Valve Stem to Guide Clearance | I 0.061 | E 0.074 | I 0.074 | E 0.066 | I 0.058 | E 0.076 |
| Valve Spring Force (N-m) | I 378 | E 383 | I 369 | E 378 | I 343 | E 374 |
| Piston Avg. Diameter Middle & bottom of skirt | 95.232 | 95.245 | 95.232 | 95.237 | 95.232 | 95.232 |
| Main Bearings | | | | | | |
| Journal Diameter | H 63.470 | V 63.470 | H 63.470 | V 63.475 | H 63.467 | V 63.475 |
| Shell Diameter | F 63.538 | F 63.520 | F 63.543 | F 63.536 | F 63.538 | F 63.538 |
| Compression Ring Cape | 0.25-0.51 | | | | | |
| Top | | | | | | |
| Bottom | | | | | | |
| Cylinder Bore Diameter | 95.250 | | | | | |
| Out-of-round | 0.13 max | | | | | |
| Taper | 0.13 max | | | | | |
| Connecting Rod Bearings | | | | | | |
| Journal Diameter | 53.172-53.226 | | | | | |
| Shell Diameter | 53.198-53.277 | | | | | |
| Camshaft Lobe Lift | | | | | | |
| Intake | | | | | | |
| Exhaust | | | | | | |
| Valve Stem to Guide Clearance | | | | | | |
| Intake | | | | | | |
| Exhaust | | | | | | |
| Valve Spring Force (N-m) | | | | | | |
| 423-467 at 46.04 mm | | | | | | |
| Piston Diameter | | | | | | |
| Main Bearings | | | | | | |
| Journal Diameter | | | | | | |
| Shell Diameter | | | | | | |
| Manufacturer's Service Limits, mm | | | | | | |
| Piston Diameter | | | | | | |
| Main Bearings | | | | | | |
| Journal Diameter | | | | | | |
| Shell Diameter | | | | | | |
| Valve Stem to Guide Clearance | | | | | | |
| Intake | | | | | | |
| Exhaust | | | | | | |
| Valve Spring Force (N-m) | | | | | | |
| 423-467 at 46.04 mm | | | | | | |
| Piston Diameter | | | | | | |
| Main Bearings | | | | | | |
| Journal Diameter | | | | | | |
| Shell Diameter | | | | | | |
| Valve Stem to Guide Clearance | | | | | | |
| Intake | | | | | | |
| Exhaust | | | | | | |
| Valve Spring Force (N-m) | | | | | | |
| 423-467 at 46.04 mm | | | | | | |
| Piston Diameter | | | | | | |
| Main Bearings | | | | | | |
| Journal Diameter | | | | | | |
| Shell Diameter | | | | | | |
| Valve Stem to Guide Clearance | | | | | | |
| Intake | | | | | | |
| Exhaust | | | | | | |
| Valve Spring Force (N-m) | | | | | | |
| 423-467 at 46.04 mm | | | | | | |
| Piston Diameter | | | | | | |
| Main Bearings | | | | | | |
| Journal Diameter | | | | | | |
| Shell Diameter | | | | | | |
| Valve Stem to Guide Clearance | | | | | | |
| Intake | | | | | | |
| Exhaust | | | | | | |
| Valve Spring Force (N-m) | | | | | | |
| 423-467 at 46.04 mm | | | | | | |
| Piston Diameter | | | | | | |
| Main Bearings | | | | | | |
| Journal Diameter | | | | | | |
| Shell Diameter | | | | | | |
| Valve Stem to Guide Clearance | | | | | | |
| Intake | | | | | | |
| Exhaust | | | | | | |
| Valve Spring Force (N-m) | | | | | | |
| 423-467 at 46.04 mm | | | | | | |
| Piston Diameter | | | | | | |
| Main Bearings | | | | | | |
| Journal Diameter | | | | | | |
| Shell Diameter | | | | | | |
| Valve Stem to Guide Clearance | | | | | | |
| Intake | | | | | | |
| Exhaust | | | | | | |
| Valve Spring Force (N-m) | | | | | | |
| 423-467 at 46.04 mm | | | | | | |
| Piston Diameter | | | | | | |
| Main Bearings | | | | | | |
| Journal Diameter | | | | | | |
| Shell Diameter | | | | | | |
| Valve Stem to Guide Clearance | | | | | | |
| Intake | | | | | | |
| Exhaust | | | | | | |
| Valve Spring Force (N-m) | | | | | | |
| 423-467 at 46.04 mm | | | | | | |
| Piston Diameter | | | | | | |
| Main Bearings | | | | | | |
| Journal Diameter | | | | | | |
| Shell Diameter | | | | | | |
| Valve Stem to Guide Clearance | | | | | | |
| Intake | | | | | | |
| Exhaust | | | | | | |
| Valve Spring Force (N-m) | | | | | | |
| 423-467 at 46.04 mm | | | | | | |
| Piston Diameter | | | | | | |
| Main Bearings | | | | | | |
| Journal Diameter | | | | | | |
| Shell Diameter | | | | | | |
| Valve Stem to Guide Clearance | | | | | | |
| Intake | | | | | | |
| Exhaust | | | | | | |
| Valve Spring Force (N-m) | | | | | | |
| 423-467 at 46.04 mm | | | | | | |
| Piston Diameter | | | | | | |
| Main Bearings | | | | | | |
| Journal Diameter | | | | | | |
| Shell Diameter | | | | | | |
| Valve Stem to Guide Clearance | | | | | | |
| Intake | | | | | | |
| Exhaust | | | | | | |
| Valve Spring Force (N-m) | | | | | | |
| 423-467 at 46.04 mm | | | | | | |
| Piston Diameter | | | | | | |
| Main Bearings | | | | | | |
| Journal Diameter | | | | | | |
| Shell Diameter | | | | | | |
| Valve Stem to Guide Clearance | | | | | | |
| Intake | | | | | | |
| Exhaust | | | | | | |
| Valve Spring Force (N-m) | | | | | | |
| 423-467 at 46.04 mm | | | | | | |
| Piston Diameter | | | | | | |
| Main Bearings | | | | | | |
| Journal Diameter | | | | | | |
| Shell Diameter | | | | | | |
| Valve Stem to Guide Clearance | | | | | | |
| Intake | | | | | | |
| Exhaust | | | | | | |
| Valve Spring Force (N-m) | | | | | | |
| 423-467 at 46.04 mm | | | | | | |
| Piston Diameter | | | | | | |
| Main Bearings | | | | | | |
| Journal Diameter | | | | | | |
| Shell Diameter | | | | | | |
| Valve Stem to Guide Clearance | | | | | | |
| Intake | | | | | | |
| Exhaust | | | | | | |
| Valve Spring Force (N-m) | | | | | | |
| 423-467 at 46.04 mm | | | | | | |
| Piston Diameter | | | | | | |
| Main Bearings | | | | | | |
| Journal Diameter | | | | | | |
| Shell Diameter | | | | | | |
| Valve Stem to Guide Clearance | | | | | | |
| Intake | | | | | | |
| Exhaust | | | | | | |
| Valve Spring Force (N-m) | | | | | | |
| 423-467 at 46.04 mm | | | | | | |
| Piston Diameter | | | | | | |
| Main Bearings | | | | | | |
| Journal Diameter | | | | | | |
| Shell Diameter | | | | | | |
| Valve Stem to Guide Clearance | | | | | | |
| Intake | | | | | | |
| Exhaust | | | | | | |
| Valve Spring Force (N-m) | | | | | | |
| 423-467 at 46.04 mm | | | | | | |
| Piston Diameter | | | | | | |
| Main Bearings | | | | | | |
| Journal Diameter | | | | | | |
| Shell Diameter | | | | | | |
| Valve Stem to Guide Clearance | | | | | | |
| Intake | | | | | | |
| Exhaust | | | | | | |
| Valve Spring Force (N-m) | | | | | | |
| 423-467 at 46.04 mm | | | | | | |
| Piston Diameter | | | | | | |
| Main Bearings | | | | | | |
| Journal Diameter | | | | | | |
| Shell Diameter | | | | | | |
| Valve Stem to Guide Clearance | | | | | | |
| Intake | | | | | | |
| Exhaust | | | | | | |
| Valve Spring Force (N-m) | | | | | | |
| 423-467 at 46.04 mm | | | | | | |
| Piston Diameter | | | | | | |
| Main Bearings | | | | | | |
| Journal Diameter | | | | | | |
| Shell Diameter | | | | | | |
| Valve Stem to Guide Clearance | | | | | | |
| Intake | | | | | | |
| Exhaust | | | | | | |
| Valve Spring Force (N-m) | | | | | | |
| 423-467 at 46.04 mm | | | | | | |
| Piston Diameter | | | | | | |
| Main Bearings | | | | | | |
| Journal Diameter | | | | | | |
| Shell Diameter | | | | | | |
| Valve Stem to Guide Clearance | | | | | | |
| Intake | | | | | | |
| Exhaust | | | | | | |
| Valve Spring Force (N-m) | | | | | | |
| 423-467 at 46.04 mm | | | | | | |
| Piston Diameter | | | | | | |
| Main Bearings | | | | | | |
| Journal Diameter | | | | | | |
| Shell Diameter | | | | | | |
| Valve Stem to Guide Clearance | | | | | | |
| Intake | | | | | | |
| Exhaust | | | | | | |
| Valve Spring Force (N-m) | | | | | | |
| 423-467 at 46.04 mm | | | | | | |
| Piston Diameter | | | | | | |
| Main Bearings | | | | | | |
| Journal Diameter | | | | | | |
| Shell Diameter | | | | | | |
| Valve Stem to Guide Clearance | | | | | | |
| Intake | | | | | | |
| Exhaust | | | | | | |
| Valve Spring Force (N-m) | | | | | | |
| 423-467 at 46.04 mm | | | | | | |
| Piston Diameter | | | | | | |
| Main Bearings | | | | | | |
| Journal Diameter | | | | | | |
| Shell Diameter | | | | | | |
| Valve Stem to Guide Clearance | | | | | | |
| Intake | | | | | | |
| Exhaust | | | | | | |
| Valve Spring Force (N-m) | | | | | | |
| 423-467 at 46.04 mm | | | | | | |
| Piston Diameter | | | | | | |
| Main Bearings | | | | | | |
| Journal Diameter | | | | | | |
| Shell Diameter | | | | | | |
| Valve Stem to Guide Clearance | | | | | | |
| Intake | | | | | | |
| Exhaust | | | | | | |
| Valve Spring Force (N-m) | | | | | | |
| 423-467 at 46.04 mm | | | | | | |
| Piston Diameter | | | | | | |
| Main Bearings | | | | | | |
| Journal Diameter | | | | | | |
| Shell Diameter | | | | | | |
| Valve Stem to Guide Clearance | | | | | | |
| Intake | | | | | | |
| Exhaust | | | | | | |
| Valve Spring Force (N-m) | | | | | | |
| 423-467 at 46.04 mm | | | | | | |
| Piston Diameter | | | | | | |
| Main Bearings | | | | | | |
| Journal Diameter | | | | | | |
| Shell Diameter | | | | | | |
| Valve Stem to Guide Clearance | | | | | | |
| Intake | | | | | | |
| Exhaust | | | | | | |
| Valve Spring Force (N-m) | | | | | | |
| 423-467 at 46.04 mm | | | | | | |
| Piston Diameter | | | | | | |
| Main Bearings | | | | | | |
| Journal Diameter | | | | | | |
| Shell Diameter | | | | | | |
| Valve Stem to Guide Clearance | | | | | | |
| Intake | | | | | | |
| Exhaust | | | | | | |
| Valve Spring Force (N-m) | | | | | | |
| 423 | | | | | | |

ENGINE COMPONENTS MEASUREMENTS
FT. MCCOY, WI
ENGINE TYPE: AMC 6 CYLINDER, 232 CID
ENGINE NUMBER: CD0935 TYPE FUEL: GASOHOL

| Component | Cylinder No. | | | | | |
|--|---------------|--------|--------|--------|--------|--------|
| | 1 | 2 | 3 | 4 | 5 | 6 |
| Compression Ring | | | | | | |
| Cape | | | | | | |
| Top | 0.029 | 0.030 | 0.028 | 0.027 | 0.029 | 0.029 |
| Bottom | 0.034 | 0.033 | 0.034 | 0.032 | 0.031 | 0.031 |
| Cylinder Bore | | | | | | |
| Diameter | | | | | | |
| Top | 3.7533 | 3.7506 | 3.7517 | 3.7513 | 3.7518 | 3.7521 |
| Middle | 3.7522 | 3.7503 | 3.7517 | 3.7511 | 3.7510 | 3.7516 |
| Bottom | 3.7517 | 3.7514 | 3.7520 | 3.7517 | 3.7513 | 3.7518 |
| Out-of-round | 0.0027 | 0.0012 | 0.0016 | 0.0011 | 0.0007 | 0.0001 |
| Taper | 0.0016 | 0.0009 | 0.0012 | 0.0007 | 0.0000 | 0.0006 |
| Connecting Rod | | | | | | |
| Bearing | | | | | | |
| Journal Diameter | 2.0942 | 2.0940 | 2.0944 | 2.0944 | 2.0943 | 2.0943 |
| Shell Diameter | 2.0970 | 2.0972 | 2.0977 | 2.0972 | 2.0973 | 2.0979 |
| Camshaft Lobe | | | | | | |
| Lift | 0.228 | 0.232 | 0.229 | 0.233 | 0.228 | 0.227 |
| Valve Stem to | | | | | | |
| Guide Clearance | 0.0019 | 0.0032 | 0.0016 | 0.0017 | 0.0031 | 0.0032 |
| Valve Spring | | | | | | |
| Force (lb) | 84 | 87 | 88 | 85 | 88 | 87 |
| Piston Avg. Diameter | | | | | | |
| Middle & bottom | 3.7496 | 3.7496 | 3.7499 | 3.7498 | 3.7491 | 3.7490 |
| Main Bearings | | | | | | |
| Journal Diameter | 2.4990 | 2.4988 | 2.4989 | 2.4992 | 2.4989 | 2.4990 |
| Shell Diameter | 2.5009 | 2.5019 | 2.5012 | 2.5015 | 2.5017 | 2.5011 |
| Compression Ring Cape | | | | | | |
| Top | 0.010-0.020 | | | | | |
| Bottom | 3.7500 | | | | | |
| Cylinder Bore Diameter | 0.005 max | | | | | |
| Out-of-round | 0.005 max | | | | | |
| Taper | 2.0934-2.0955 | | | | | |
| Connecting Rod Bearings | 2.0944-2.0975 | | | | | |
| Journal Diameter | | | | | | |
| Shell Diameter | | | | | | |
| Manufacturer's Service Limits, Inches | | | | | | |
| Cape | 0.010-0.020 | | | | | |
| Bottom | 3.7500 | | | | | |
| Cylinder Bore Diameter | 0.005 max | | | | | |
| Out-of-round | 0.005 max | | | | | |
| Taper | 2.0934-2.0955 | | | | | |
| Connecting Rod Bearings | 2.0944-2.0975 | | | | | |
| Journal Diameter | | | | | | |
| Shell Diameter | | | | | | |
| Manufacturer's Service Limits, Inches | | | | | | |
| Cape | 0.010-0.020 | | | | | |
| Bottom | 3.7500 | | | | | |
| Cylinder Bore Diameter | 0.005 max | | | | | |
| Out-of-round | 0.005 max | | | | | |
| Taper | 2.0934-2.0955 | | | | | |
| Connecting Rod Bearings | 2.0944-2.0975 | | | | | |
| Journal Diameter | | | | | | |
| Shell Diameter | | | | | | |
| Manufacturer's Service Limits, Inches | | | | | | |
| Cape | 0.010-0.020 | | | | | |
| Bottom | 3.7500 | | | | | |
| Cylinder Bore Diameter | 0.005 max | | | | | |
| Out-of-round | 0.005 max | | | | | |
| Taper | 2.0934-2.0955 | | | | | |
| Connecting Rod Bearings | 2.0944-2.0975 | | | | | |
| Journal Diameter | | | | | | |
| Shell Diameter | | | | | | |
| Manufacturer's Service Limits, Inches | | | | | | |
| Cape | 0.010-0.020 | | | | | |
| Bottom | 3.7500 | | | | | |
| Cylinder Bore Diameter | 0.005 max | | | | | |
| Out-of-round | 0.005 max | | | | | |
| Taper | 2.0934-2.0955 | | | | | |
| Connecting Rod Bearings | 2.0944-2.0975 | | | | | |
| Journal Diameter | | | | | | |
| Shell Diameter | | | | | | |
| Manufacturer's Service Limits, Inches | | | | | | |
| Cape | 0.010-0.020 | | | | | |
| Bottom | 3.7500 | | | | | |
| Cylinder Bore Diameter | 0.005 max | | | | | |
| Out-of-round | 0.005 max | | | | | |
| Taper | 2.0934-2.0955 | | | | | |
| Connecting Rod Bearings | 2.0944-2.0975 | | | | | |
| Journal Diameter | | | | | | |
| Shell Diameter | | | | | | |
| Manufacturer's Service Limits, Inches | | | | | | |
| Cape | 0.010-0.020 | | | | | |
| Bottom | 3.7500 | | | | | |
| Cylinder Bore Diameter | 0.005 max | | | | | |
| Out-of-round | 0.005 max | | | | | |
| Taper | 2.0934-2.0955 | | | | | |
| Connecting Rod Bearings | 2.0944-2.0975 | | | | | |
| Journal Diameter | | | | | | |
| Shell Diameter | | | | | | |
| Manufacturer's Service Limits, Inches | | | | | | |
| Cape | 0.010-0.020 | | | | | |
| Bottom | 3.7500 | | | | | |
| Cylinder Bore Diameter | 0.005 max | | | | | |
| Out-of-round | 0.005 max | | | | | |
| Taper | 2.0934-2.0955 | | | | | |
| Connecting Rod Bearings | 2.0944-2.0975 | | | | | |
| Journal Diameter | | | | | | |
| Shell Diameter | | | | | | |
| Manufacturer's Service Limits, Inches | | | | | | |
| Cape | 0.010-0.020 | | | | | |
| Bottom | 3.7500 | | | | | |
| Cylinder Bore Diameter | 0.005 max | | | | | |
| Out-of-round | 0.005 max | | | | | |
| Taper | 2.0934-2.0955 | | | | | |
| Connecting Rod Bearings | 2.0944-2.0975 | | | | | |
| Journal Diameter | | | | | | |
| Shell Diameter | | | | | | |
| Manufacturer's Service Limits, Inches | | | | | | |
| Cape | 0.010-0.020 | | | | | |
| Bottom | 3.7500 | | | | | |
| Cylinder Bore Diameter | 0.005 max | | | | | |
| Out-of-round | 0.005 max | | | | | |
| Taper | 2.0934-2.0955 | | | | | |
| Connecting Rod Bearings | 2.0944-2.0975 | | | | | |
| Journal Diameter | | | | | | |
| Shell Diameter | | | | | | |
| Manufacturer's Service Limits, Inches | | | | | | |
| Cape | 0.010-0.020 | | | | | |
| Bottom | 3.7500 | | | | | |
| Cylinder Bore Diameter | 0.005 max | | | | | |
| Out-of-round | 0.005 max | | | | | |
| Taper | 2.0934-2.0955 | | | | | |
| Connecting Rod Bearings | 2.0944-2.0975 | | | | | |
| Journal Diameter | | | | | | |
| Shell Diameter | | | | | | |
| Manufacturer's Service Limits, Inches | | | | | | |
| Cape | 0.010-0.020 | | | | | |
| Bottom | 3.7500 | | | | | |
| Cylinder Bore Diameter | 0.005 max | | | | | |
| Out-of-round | 0.005 max | | | | | |
| Taper | 2.0934-2.0955 | | | | | |
| Connecting Rod Bearings | 2.0944-2.0975 | | | | | |
| Journal Diameter | | | | | | |
| Shell Diameter | | | | | | |
| Manufacturer's Service Limits, Inches | | | | | | |
| Cape | 0.010-0.020 | | | | | |
| Bottom | 3.7500 | | | | | |
| Cylinder Bore Diameter | 0.005 max | | | | | |
| Out-of-round | 0.005 max | | | | | |
| Taper | 2.0934-2.0955 | | | | | |
| Connecting Rod Bearings | 2.0944-2.0975 | | | | | |
| Journal Diameter | | | | | | |
| Shell Diameter | | | | | | |
| Manufacturer's Service Limits, Inches | | | | | | |
| Cape | 0.010-0.020 | | | | | |
| Bottom | 3.7500 | | | | | |
| Cylinder Bore Diameter | 0.005 max | | | | | |
| Out-of-round | 0.005 max | | | | | |
| Taper | 2.0934-2.0955 | | | | | |
| Connecting Rod Bearings | 2.0944-2.0975 | | | | | |
| Journal Diameter | | | | | | |
| Shell Diameter | | | | | | |
| Manufacturer's Service Limits, Inches | | | | | | |
| Cape | 0.010-0.020 | | | | | |
| Bottom | 3.7500 | | | | | |
| Cylinder Bore Diameter | 0.005 max | | | | | |
| Out-of-round | 0.005 max | | | | | |
| Taper | 2.0934-2.0955 | | | | | |
| Connecting Rod Bearings | 2.0944-2.0975 | | | | | |
| Journal Diameter | | | | | | |
| Shell Diameter | | | | | | |
| Manufacturer's Service Limits, Inches | | | | | | |
| Cape | 0.010-0.020 | | | | | |
| Bottom | 3.7500 | | | | | |
| Cylinder Bore Diameter | 0.005 max | | | | | |
| Out-of-round | 0.005 max | | | | | |
| Taper | 2.0934-2.0955 | | | | | |
| Connecting Rod Bearings | 2.0944-2.0975 | | | | | |
| Journal Diameter | | | | | | |
| Shell Diameter | | | | | | |
| Manufacturer's Service Limits, Inches | | | | | | |
| Cape | 0.010-0.020 | | | | | |
| Bottom | 3.7500 | | | | | |
| Cylinder Bore Diameter | 0.005 max | | | | | |
| Out-of-round | 0.005 max | | | | | |
| Taper | 2.0934-2.0955 | | | | | |
| Connecting Rod Bearings | 2.0944-2.0975 | | | | | |
| Journal Diameter | | | | | | |
| Shell Diameter | | | | | | |
| Manufacturer's Service Limits, Inches | | | | | | |
| Cape | 0.010-0.020 | | | | | |
| Bottom | 3.7500 | | | | | |
| Cylinder Bore Diameter | 0.005 max | | | | | |
| Out-of-round | 0.005 max | | | | | |
| Taper | 2.0934-2.0955 | | | | | |
| Connecting Rod Bearings | 2.0944-2.0975 | | | | | |
| Journal Diameter | | | | | | |
| Shell Diameter | | | | | | |
| Manufacturer's Service Limits, Inches | | | | | | |
| Cape | 0.010-0.020 | | | | | |
| Bottom | 3.7500 | | | | | |
| Cylinder Bore Diameter | 0.005 max | | | | | |
| Out-of-round | 0.005 max | | | | | |
| Taper | 2.0934-2.0955 | | | | | |
| Connecting Rod Bearings | 2.0944-2.0975 | | | | | |
| Journal Diameter | | | | | | |
| Shell Diameter | | | | | | |
| Manufacturer's Service Limits, Inches | | | | | | |
| Cape | 0.010-0.020 | | | | | |
| Bottom | 3.7500 | | | | | |
| Cylinder Bore Diameter | 0.005 max | | | | | |
| Out-of-round | 0.005 max | | | | | |
| Taper | 2.0934-2.0955 | | | | | |
| Connecting Rod Bearings | 2.0944-2.0975 | | | | | |
| Journal Diameter | | | | | | |
| Shell Diameter | | | | | | |
| Manufacturer's Service Limits, Inches | | | | | | |
| Cape | 0.010-0.020 | | | | | |
| Bottom | 3.7500 | | | | | |
| Cylinder Bore Diameter | 0.005 max | | | | | |
| Out-of-round | 0.005 max | | | | | |
| Taper | 2.0934-2.0955 | | | | | |
| Connecting Rod Bearings | 2.0944-2.0975 | | | | | |
| Journal Diameter | | | | | | |
| Shell Diameter | | | | | | |
| Manufacturer's Service Limits, Inches | | | | | | |
| Cape | 0.010-0.020 | | | | | |
| Bottom | 3.7500 | | | | | |
| Cylinder Bore Diameter | 0.005 max | | | | | |
| Out-of-round | 0.005 max | | | | | |
| Taper | 2.0934-2.0955 | | | | | |
| Connecting Rod Bearings | 2.0944-2.0975 | | | | | |
| Journal Diameter | | | | | | |
| Shell Diameter | | | | | | |
| Manufacturer's Service Limits, Inches | | | | | | |
| Cape | 0.010-0.020 | | | | | |
| Bottom | 3.7500 | | | | | |
| Cylinder Bore Diameter | 0.005 max | | | | | |
| Out-of-round | 0.005 max | | | | | |
| Taper | 2.0934-2.0955 | | | | | |
| Connecting Rod Bearings | 2.0944-2.0975 | | | | | |
| Journal Diameter | | | | | | |
| Shell Diameter | | | | | | |
| Manufacturer's Service Limits, Inches | | | | | | |
| Cape | 0.010-0.020 | | | | | |
| Bottom | 3.7500 | | | | | |
| Cylinder Bore Diameter | 0.005 max | | | | | |
| Out-of-round | 0.005 max | | | | | |
| Taper | 2.0934-2.0955 | | | | | |
| Connecting Rod Bearings | 2.0944-2.0975 | | | | | |
| Journal Diameter | | | | | | |
| Shell Diameter | | | | | | |
| Manufacturer's Service Limits, Inches | | | | | | |
| Cape | 0.010-0.020 | | | | | |
| Bottom | 3.7500 | | | | | |
| Cylinder Bore Diameter | 0.005 max | | | | | |
| Out-of-round | 0.005 max | | | | | |
| Taper | 2.0934-2.0955 | | | | | |
| Connecting Rod Bearings | 2.0944-2.0975 | | | | | |
| Journal Diameter | | | | | | |

ENGINE NUMBER: CD0935 TYPE FUEL: GASOHOL

②

ENGINE COMPONENTS MEASUREMENTS
FT. MCCOY, WI
ENGINE TYPE: AMC 6 CYLINDER, 232 CID
ENGINE NUMBER: CDO939 TYPE FUEL: GASOHOL

| Component | Cylinder No. | | | | | |
|--|---------------|--------|--------|--------|--------|--------|
| | 1 | 2 | 3 | 4 | 5 | 6 |
| Compression Ring | | | | | | |
| Gaps | | | | | | |
| Top | 0.030 | 0.028 | 0.027 | 0.027 | 0.026 | 0.025 |
| Bottom | 0.036 | 0.035 | 0.035 | 0.036 | 0.037 | 0.032 |
| Cylinder Bore | | | | | | |
| Diameter | | | | | | |
| Top | 3.7553 | 3.7524 | 3.7527 | 3.7544 | 3.7541 | 3.7547 |
| Middle | 3.7527 | 3.7509 | 3.7511 | 3.7518 | 3.7515 | 3.7519 |
| Bottom | 3.7521 | 3.7517 | 3.7516 | 3.7516 | 3.7518 | 3.7524 |
| Out-of-round | 0.0029 | 0.0025 | 0.0025 | 0.0013 | 0.0013 | 0.0002 |
| Taper | 0.0032 | 0.0036 | 0.0028 | 0.0031 | 0.0019 | 0.0024 |
| Connecting Rod | | | | | | |
| Bearings | | | | | | |
| Journal Diameter | 2.0940 | 2.0940 | 2.0940 | 2.0940 | 2.0940 | 2.0941 |
| Shell Diameter | 2.0965 | 2.0971 | 2.0966 | 2.0967 | 2.0965 | 2.0967 |
| Camshaft Lobe | | | | | | |
| Lift | 0.230 | 0.230 | 0.225 | 0.230 | 0.230 | 0.230 |
| Valve Stem to Guide Clearance | | | | | | |
| Intake | 0.0022 | 0.0026 | 0.0022 | 0.0024 | 0.0024 | 0.0023 |
| Exhaust | 0.0022 | 0.0026 | 0.0022 | 0.0024 | 0.0024 | 0.0023 |
| Valve Spring Force (lb) | | | | | | |
| Intake | 85 | 88 | 89 | 87 | 88 | 88 |
| Exhaust | 85 | 88 | 89 | 87 | 88 | 88 |
| Piston Avg. Diameter Middle & bottom of skirt | | | | | | |
| Intake | 3.7489 | 3.7494 | 3.7499 | 3.7490 | 3.7501 | 3.7507 |
| Exhaust | 3.7489 | 3.7494 | 3.7499 | 3.7490 | 3.7501 | 3.7507 |
| Main Bearings | | | | | | |
| Journal Diameter | 2.4988 | 2.4988 | 2.4988 | 2.4991 | 2.4989 | 2.4987 |
| Shell Diameter | 2.5021 | 2.5023 | 2.5022 | 2.5024 | 2.5021 | 2.5020 |
| Compression Ring Gaps | | | | | | |
| Top | 0.010-0.020 | | | | | |
| Bottom | 3.7500 | | | | | |
| Out-of-round | 0.005 max | | | | | |
| Taper | 0.005 max | | | | | |
| Connecting Rod Bearings | 2.0934-2.0955 | | | | | |
| Journal Diameter | 2.0944-2.0975 | | | | | |
| Shell Diameter | | | | | | |

Manufacturer's Service Limits, Inches

Intake = Intake, Exhaust = Exhaust, H = Horizontal, V = Vertical, F = Forward, B = Back, I = Intake, E = Exhaust

± = Measurements are in mm

ENGINE COMPONENTS MEASUREMENTS
FT. MCCOY, WI
ENGINE TYPE: AMC 6 CYLINDER, 232 CID
ENGINE NUMBER: CD0939 TYPE FUEL: GASOHOL

| Component | Cylinder No. | | | | | |
|--|---------------|--------|-------------------------------|--------|---------------------|--------|
| | 1 | 2 | 3 | 4 | 5 | 6 |
| Compression Ring | | | | | | |
| Cape | 0.76 | 0.71 | 0.69 | 0.69 | 0.66 | 0.64 |
| Top | 0.91 | 0.89 | 0.89 | 0.91 | 0.94 | 0.81 |
| Bottom | | | | | | |
| Cylinder Bore Diameter | | | | | | |
| Top | 95.385 | 95.311 | 95.319 | 95.362 | 95.354 | 95.341 |
| Middle | 95.319 | 95.273 | 95.288 | 95.278 | 95.296 | 95.288 |
| Bottom | 95.303 | 95.293 | 95.291 | 95.283 | 95.291 | 95.298 |
| Out-of-round | 0.074 | 0.063 | 0.068 | 0.063 | 0.033 | 0.005 |
| Taper | 0.082 | 0.091 | 0.071 | 0.078 | 0.049 | 0.061 |
| Connecting Rod Bearings | | | | | | |
| Journal Diameter | H | V | H | V | H | V |
| Shell Diameter | F | B | F | B | F | B |
| | 53.188 | 53.188 | 53.188 | 53.188 | 53.188 | 53.188 |
| | 53.251 | 53.266 | 53.234 | 53.256 | 53.236 | 53.254 |
| | 53.251 | 53.266 | 53.234 | 53.256 | 53.236 | 53.254 |
| Camshaft Lobe Lift | | | | | | |
| | I | E | I | E | I | E |
| | 5.84 | 5.84 | 5.72 | 5.84 | 5.84 | 5.84 |
| Valve Stem to Guide Clearance | | | | | | |
| | I | E | I | E | I | E |
| | 0.0056 | 0.0066 | 0.0056 | 0.0066 | 0.0056 | 0.0066 |
| Valve Spring Force (N-m) | | | | | | |
| | I | E | I | E | I | E |
| | 396 | 391 | 391 | 387 | 391 | 391 |
| Piston Avg. Diameter Middle & bottom of skirt | | | | | | |
| | 95.222 | 95.235 | 95.247 | 95.225 | 95.253 | 95.268 |
| Main Bearings | | | | | | |
| Journal Diameter | No. 1 | No. 2 | No. 3 | No. 4 | No. 5 | No. 6 |
| Shell Diameter | H | V | H | V | H | V |
| | 63.470 | 63.470 | 63.480 | 63.477 | 63.475 | 63.467 |
| | 63.553 | 63.558 | 63.548 | 63.561 | 63.553 | 63.548 |
| | 63.553 | 63.558 | 63.548 | 63.561 | 63.553 | 63.548 |
| Compression Ring Cape | | | | | | |
| Top | 0.25-0.51 | | | | | |
| Bottom | | | | | | |
| Cylinder Bore Diameter | | | | | | |
| Top | 95.250 | | | | | |
| Out-of-round | 0.13 max | | | | | |
| Taper | 0.13 max | | | | | |
| Connecting Rod Bearings | | | | | | |
| Journal Diameter | 53.172-53.226 | | | | | |
| Shell Diameter | 53.198-53.277 | | | | | |
| Manufacturer's Service Limits, mm | | | | | | |
| | | | Camshaft Lobe Lift | | Piston Diameter | |
| | | | Intake | | Main Bearings | |
| | | | Exhaust | | Journal Diameter | |
| | | | Valve Stem to Guide Clearance | | Shell Diameter | |
| | | | Intake | | | |
| | | | Exhaust | | | |
| | | | Valve Spring Force (N-m) | | 423-467 at 46.04 mm | |

*L = Longitudinal, T = Transverse, H = Horizontal, V = Vertical.
 F = Forward, B = Back, I = Intake, E = Exhaust
 * = Measurements are in mm

ENGINE COMPONENTS MEASUREMENTS
 FT. MCCOY, WI
 ENGINE TYPE: FORD V-8, 400 CID
 ENGINE NUMBER: CD7099 TYPE FUEL: UNLEADED GASOLINE

| Component | Cylinder No. | | | | | | | |
|---------------------------------------|------------------|--------|--------|--------|--------|--------|--------|--------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Compression Ring | | | | | | | | |
| Cape | | | | | | | | |
| Top | 0.035 | 0.033 | 0.032 | 0.038 | 0.031 | 0.031 | 0.033 | 0.031 |
| Bottom | 0.040 | 0.038 | 0.039 | 0.040 | 0.040 | 0.039 | 0.039 | 0.039 |
| Cylinder Bore | | | | | | | | |
| Diameter | | | | | | | | |
| Top | 4.0037 | 4.0043 | 4.0045 | 4.0046 | 4.0047 | 4.0048 | 4.0048 | 4.0048 |
| Middle | 4.0024 | 4.0040 | 4.0038 | 4.0027 | 4.0036 | 4.0029 | 4.0029 | 4.0030 |
| Bottom | 4.0028 | 4.0040 | 4.0034 | 4.0031 | 4.0041 | 4.0033 | 4.0033 | 4.0033 |
| Out-of-round | 0.0006 | 0.0002 | 0.0001 | 0.0008 | 0.0012 | 0.0004 | 0.0002 | 0.0012 |
| Taper | 0.0009 | 0.0008 | 0.0009 | 0.0008 | 0.0010 | 0.0009 | 0.0011 | 0.0008 |
| Connecting Rod | | | | | | | | |
| Bearing | | | | | | | | |
| Journal Diameter | 2.3103 | 2.3100 | 2.3100 | 2.3101 | 2.3100 | 2.3100 | 2.3101 | 2.3100 |
| Shell Diameter | 2.3130 | 2.3133 | 2.3128 | 2.3126 | 2.3130 | 2.3128 | 2.3126 | 2.3129 |
| Camshaft Lobe | | | | | | | | |
| Lift | 0.231 | 0.225 | 0.237 | 0.233 | 0.236 | 0.231 | 0.232 | 0.233 |
| Valve Stem to | | | | | | | | |
| Guide Clearance | 0.0044 | 0.0040 | 0.0041 | 0.0039 | 0.0041 | 0.0043 | 0.0047 | 0.0045 |
| Valve Spring | | | | | | | | |
| Force (lb) | 224 | 220 | 223 | 219 | 223 | 221 | 220 | 221 |
| Piston Arg. Diameter | | | | | | | | |
| Middle & bottom | 4.0000 | 3.9994 | 3.9995 | 4.0000 | 3.9998 | 3.9995 | 3.9999 | 3.9996 |
| Main Bearings | | | | | | | | |
| Journal Diameter | 2.9994 | 2.9994 | 2.9992 | 2.9990 | 2.9991 | 2.9993 | 2.9993 | 2.9995 |
| Shell Diameter | 3.0024 | 3.0020 | 3.0015 | 3.0022 | 3.0013 | 3.0020 | 3.0020 | 3.0021 |
| Compression Ring Cape | | | | | | | | |
| Top | 0.010-0.020 | | | | | | | |
| Bottom | 4.0000-4.0048 | | | | | | | |
| Cylinder Bore Diameter | 0.0015 max | | | | | | | |
| Out-of-round | 0.010 max | | | | | | | |
| Taper | 2.3103-2.3111 | | | | | | | |
| Connecting Rod Bearings | 2.3111-2.3136 | | | | | | | |
| Journal Diameter | | | | | | | | |
| Shell Diameter | | | | | | | | |
| Manufacturer's Service Limits, Inches | | | | | | | | |
| Camshaft Lobe Lift | 0.250 | | | | | | | |
| Intake | | | | | | | | |
| Exhaust | | | | | | | | |
| Valve Stem to Guide Clearance | 0.005 | | | | | | | |
| Intake | | | | | | | | |
| Exhaust | | | | | | | | |
| Valve Spring Force (lb) | | | | | | | | |
| Intake | 76-84 at 1.82" | | | | | | | |
| Exhaust | 215-237 at 1.39" | | | | | | | |
| | 215-237 at 1.68" | | | | | | | |
| | 215-237 at 1.39" | | | | | | | |

H = Horizontal, V = Vertical,
 F = Forward, B = Back, I = Intake, E = Exhaust
 * = Measurements are in mm

ENGINE COMPONENTS MEASUREMENTS
 FT. MCCOY, WI
 ENGINE TYPE: FORD V-8, 400 CID
 ENGINE NUMBER: CD7099 TYPE FUEL: UNLEADED GASOLINE

| Component | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|-------------------------|---------|---------|---------|---------|---------|---------|---------|---------|
| Cylinder No. | | | | | | | | |
| Compression Ring | | | | | | | | |
| Cups | | 0.84 | 0.81 | 0.97 | 0.79 | 0.79 | 0.84 | 0.79 |
| Top | | 0.97 | 0.99 | 1.02 | 0.99 | 0.99 | 0.99 | 0.99 |
| Bottom | | | | | | | | |
| Cylinder Bore Diameter | | | | | | | | |
| Top | L | T | L | T | L | T | L | T |
| Middle | 101.654 | 101.709 | 101.707 | 101.712 | 101.702 | 101.699 | 101.717 | 101.702 |
| Bottom | 101.661 | 101.702 | 101.676 | 101.697 | 101.669 | 101.691 | 101.674 | 101.674 |
| Out-of-round | 0.015 | 0.003 | 0.003 | 0.020 | 0.026 | 0.011 | 0.005 | 0.030 |
| Taper | 0.023 | 0.021 | 0.023 | 0.020 | 0.030 | 0.023 | 0.028 | 0.020 |
| Connecting Rod Bearings | | | | | | | | |
| Journal Diameter | H | V | H | V | H | V | H | V |
| Shell Diameter | 38.682 | 38.674 | 38.674 | 38.674 | 38.677 | 38.674 | 38.674 | 38.677 |
| P | 38.750 | 38.758 | 38.763 | 38.745 | 38.750 | 38.750 | 38.745 | 38.738 |
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ENGINE COMPONENTS MEASUREMENTS
FT. MCCOY, WI
ENGINE TYPE: FORD V-8, 400 CID
ENGINE NUMBER: CD7097 TYPE FUEL: GASOLIN

| Component | Cylinder No. | | | | | | | | | |
|---|------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Compression Ring | | | | | | | | | | |
| Top | 0.030 | 0.028 | 0.030 | 0.029 | 0.029 | 0.030 | 0.029 | 0.029 | 0.029 | 0.029 |
| Bottom | 0.041 | 0.039 | 0.038 | 0.041 | 0.041 | 0.041 | 0.042 | 0.042 | 0.042 | 0.039 |
| Cylinder Bore Diameter | | | | | | | | | | |
| Top | 4.0034 | 4.0033 | 4.0037 | 4.0035 | 4.0031 | 4.0038 | 4.0039 | 4.0036 | 4.0044 | 4.0035 |
| Middle | 4.0024 | 4.0039 | 4.0024 | 4.0030 | 4.0026 | 4.0032 | 4.0021 | 4.0031 | 4.0037 | 4.0038 |
| Bottom | 4.0024 | 4.0042 | 4.0035 | 4.0028 | 4.0031 | 4.0023 | 4.0035 | 4.0030 | 4.0032 | 4.0035 |
| Out-of-round | 0.0009 | 0.0005 | 0.0002 | 0.0005 | 0.0008 | 0.0005 | 0.0011 | 0.0004 | 0.0008 | 0.0020 |
| Taper | 0.0010 | 0.0007 | 0.0009 | 0.0009 | 0.0008 | 0.0005 | 0.0011 | 0.0004 | 0.0008 | 0.0004 |
| Connecting Rod Bearings | | | | | | | | | | |
| Journal Diameter | 2.3104 | 2.3106 | 2.3105 | 2.3104 | 2.3105 | 2.3105 | 2.3105 | 2.3105 | 2.3105 | 2.3105 |
| Shell Diameter | 2.3120 | 2.3120 | 2.3118 | 2.3118 | 2.3122 | 2.3122 | 2.3122 | 2.3122 | 2.3122 | 2.3122 |
| Camshaft Lobe Lift | 0.106 | 0.212 | 0.186 | 0.217 | 0.210 | 0.250 | 0.221 | 0.236 | 0.116 | 0.109 |
| Valve Stem to Guide Clearance | 0.0035 | 0.0028 | 0.0025 | 0.0048 | 0.0039 | 0.0043 | 0.0039 | 0.0060 | 0.0030 | 0.0047 |
| Valve Spring Force (lb) | 176 | 177 | 175 | 177 | 175 | 179 | 175 | 175 | 176 | 178 |
| Piston Avg. Diameter Middle & bottom of skirt | 3.9996 | 3.9992 | 3.9994 | 3.9994 | 3.9995 | 3.9996 | 3.9996 | 3.9998 | 3.9987 | 3.9991 |
| Main Bearings | | | | | | | | | | |
| Journal Diameter | 2.9992 | 2.9993 | 2.9990 | 2.9990 | 2.9990 | 2.9990 | 2.9990 | 2.9992 | 2.9991 | 2.9993 |
| Shell Diameter | 3.0037 | 3.0035 | 3.0027 | 3.0043 | 3.0043 | 3.0043 | 3.0043 | 3.0038 | 3.0037 | 3.0030 |
| Compression Ring Gaps | | | | | | | | | | |
| Top | 0.010-0.020 | | | | | | | | | |
| Bottom | 4.0000-4.0040 | | | | | | | | | |
| Cylinder Bore Diameter | 0.0015 max | | | | | | | | | |
| Out-of-round | 0.010 max | | | | | | | | | |
| Taper | 2.3103-2.3111 | | | | | | | | | |
| Connecting Rod Bearings | 2.3111-2.3136 | | | | | | | | | |
| Journal Diameter | | | | | | | | | | |
| Shell Diameter | | | | | | | | | | |
| Manufacturer's Service Limits, Inches | | | | | | | | | | |
| Camshaft Lobe Lift | 0.250 | | | | | | | | | |
| Intake | | | | | | | | | | |
| Exhaust | | | | | | | | | | |
| Valve Stem to Guide Clearance | 0.005 | | | | | | | | | |
| Intake | | | | | | | | | | |
| Exhaust | | | | | | | | | | |
| Valve Spring Force (lb) | 76-84 at 1.82" | | | | | | | | | |
| Intake | 215-237 at 1.39" | | | | | | | | | |
| Exhaust | 215-237 at 1.39" | | | | | | | | | |

L = Longitudinal, T = Transverse, H = Horizontal, V = Vertical,
P = Forward, B = Back, I = Intake, E = Exhaust
* - Measurements are in mm

ENGINE NUMBER: CD7098 TYPE FUEL: GASOHOL

10

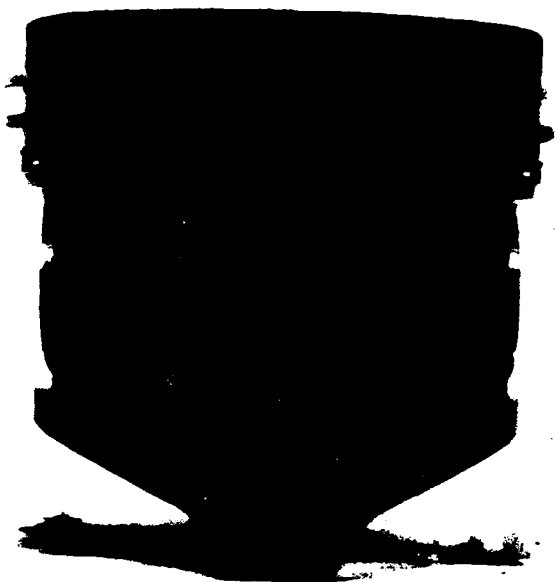
ENGINE COMPONENTS MEASUREMENTS
 FT. MCCOY, WI
 ENGINE TYPE: FORD V-8, 400 CID
 ENGINE NUMBER: CD7098 TYPE FUEL: GASOHOL

| Component | Cylinder No. | | | | | | | |
|-----------------------------------|---------------------|---------|---------|---------|---------|---------|---------|---------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Compression Ring | | | | | | | | |
| Cape | | | | | | | | |
| Top | 0.89 ⁺ | 0.89 | 0.84 | 0.86 | 0.84 | 0.84 | 0.84 | 0.84 |
| Bottom | 1.45 | 1.24 | 1.30 | 1.37 | 1.47 | 1.47 | 1.50 | 1.50 |
| Cylinder Bore | | | | | | | | |
| Diameter | | | | | | | | |
| Top | 101.659 | 101.657 | 101.654 | 101.654 | 101.659 | 101.657 | 101.654 | 101.654 |
| Middle | 101.691 | 101.664 | 101.674 | 101.686 | 101.676 | 101.651 | 101.694 | 101.674 |
| Bottom | 101.694 | 101.666 | 101.671 | 101.679 | 101.681 | 101.689 | 101.681 | 101.679 |
| Out-of-round | 0.002 | 0.005 | 0.020 | 0.002 | 0.013 | 0.010 | 0.005 | 0.008 |
| Taper | 0.005 | 0.023 | 0.013 | 0.008 | 0.013 | 0.016 | 0.023 | 0.000 |
| Connecting Rod | | | | | | | | |
| Bearings | | | | | | | | |
| Journal Diameter | 58.687 | 58.689 | 58.694 | 58.702 | 58.694 | 58.689 | 58.689 | 58.692 |
| Shell Diameter | 58.725 | 58.732 | 58.725 | 58.722 | 58.730 | 58.738 | 58.745 | 58.748 |
| Camshaft Lobe | | | | | | | | |
| Lift | 5.97 | 5.49 | 5.92 | 6.17 | 5.92 | 6.15 | 5.46 | 5.92 |
| Valve Stem to | | | | | | | | |
| Guide Clearance | 0.076 | 0.076 | 0.140 | 0.107 | 0.109 | 0.089 | 0.076 | 0.071 |
| Valve Spring | | | | | | | | |
| Force (H-a) | 347 | 334 | 347 | 334 | 343 | 334 | 371 | 276 |
| Piston Avg. Diameter | 101.590 | 101.592 | 101.592 | 101.587 | 101.610 | 101.608 | 101.564 | 101.590 |
| Middle & bottom | | | | | | | | |
| Main Bearings | 75.933 | 75.943 | 75.941 | 75.943 | 75.941 | 75.943 | 75.943 | 75.943 |
| Journal Diameter | 75.933 | 75.943 | 75.941 | 75.943 | 75.941 | 75.943 | 75.943 | 75.943 |
| Shell Diameter | 76.093 | 76.093 | 76.068 | 76.093 | 76.093 | 76.073 | 76.086 | 76.088 |
| Compression Ring Cape | 0.25-0.51 | | | | | | | |
| Top | | | | | | | | |
| Bottom | | | | | | | | |
| Cylinder Bore Diameter | 101.600-101.722 | | | | | | | |
| Out-of-round | 0.038 max | | | | | | | |
| Taper | 0.25 max | | | | | | | |
| Connecting Rod Bearings | | | | | | | | |
| Journal Diameter | 58.682-58.702 | | | | | | | |
| Shell Diameter | 58.702-58.765 | | | | | | | |
| Manufacturer's Service Limits, mm | | | | | | | | |
| Camshaft Lobe Lift | 0.250 | | | | | | | |
| Intake | 6.35 | | | | | | | |
| Exhaust | | | | | | | | |
| Valve Stem to Guide Clearance | 0.13 | | | | | | | |
| Intake | | | | | | | | |
| Exhaust | | | | | | | | |
| Valve Spring Force (H-a) | 338-374 at 46.23 mm | | | | | | | |
| 956-1054 at 35.31 mm | | | | | | | | |
| 351-387 at 42.67 mm | | | | | | | | |
| 956-1054 at 35.31 mm | | | | | | | | |
| Piston Diameter | 101.585-101.600 | | | | | | | |
| Main Bearings | | | | | | | | |
| Journal Diameter | 76.185-76.205 | | | | | | | |
| Shell Diameter | 76.205-76.271 | | | | | | | |

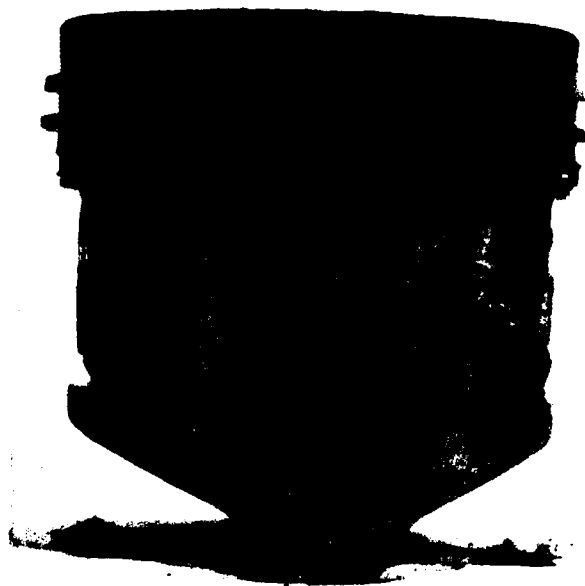
L = Longitudinal, T = Transverse, H = Horizontal, V = Vertical,
 F = Forward, B = Back, I = Intake, E = Exhaust
 * - Measurements are in mm

APPENDIX B
PHOTOGRAPHS

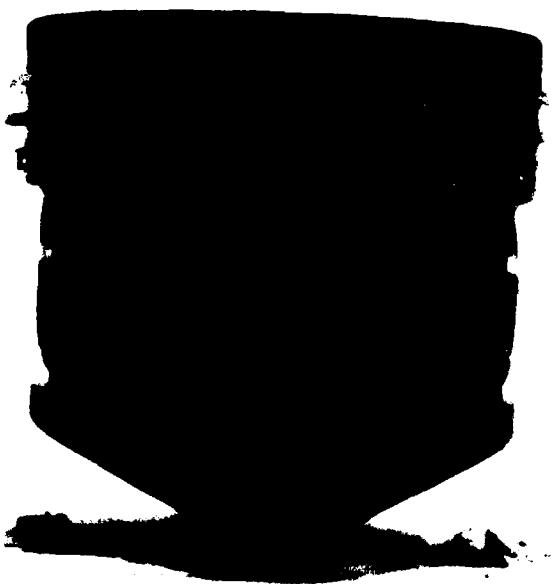
FT. BELVOIR, VA
ENGINE NO: 5001675 FUEL: UNLEADED GASOLINE



PISTON NO. 1 THRUST SIDE



PISTON NO. 1 ANTI-THRUST SIDE

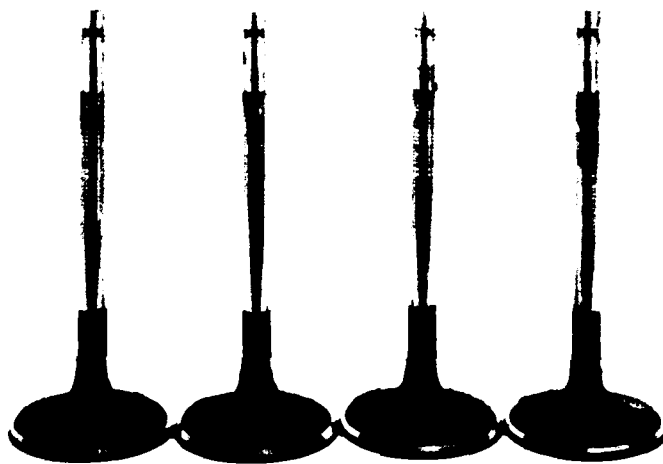


PISTON NO. 3 THRUST SIDE



PISTON NO. 3 ANTI-THRUST SIDE

FT. BELVOIR, VA
ENGINE NO: 5011675 FUEL: UNLEADED GASOLINE



INTAKE VALVES 1-4

FT. BELVOIR, VA
ENGINE NO. 5001675 FUEL: UNLEADED GASOLINE

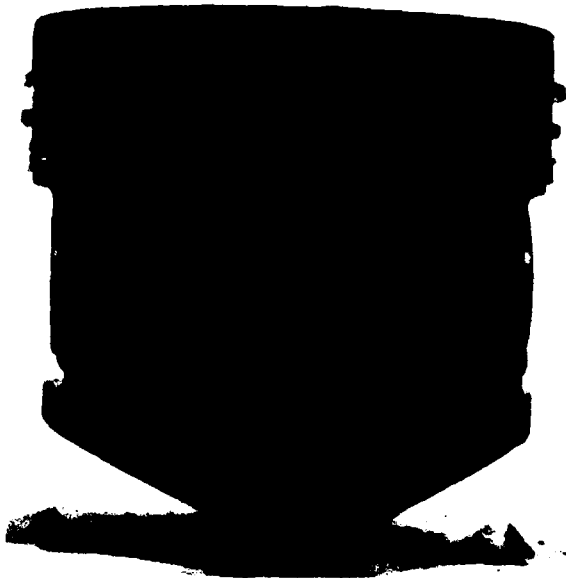


CYLINDER HEAD



CYLINDER HEAD COMBUSTION CHAMBER NO. 2

FT. BELVOIR, VA
ENGINE NO. 6003049 FUEL: GASOHOL



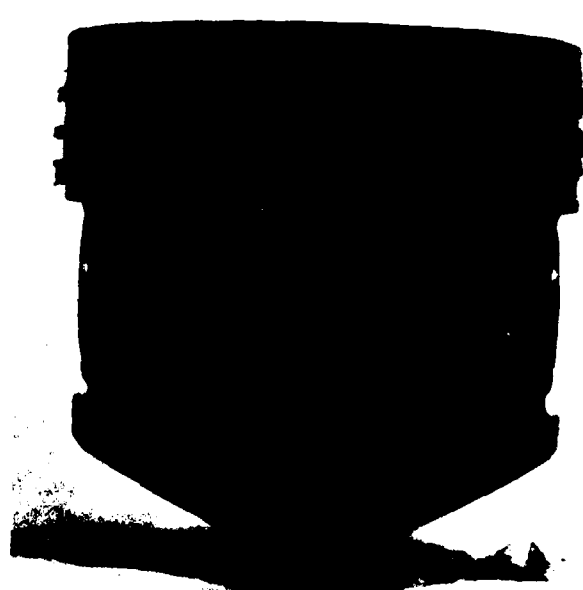
PISTON NO. 1 THRUST SIDE



PISTON NO. 1 ANTI-THRUST SIDE

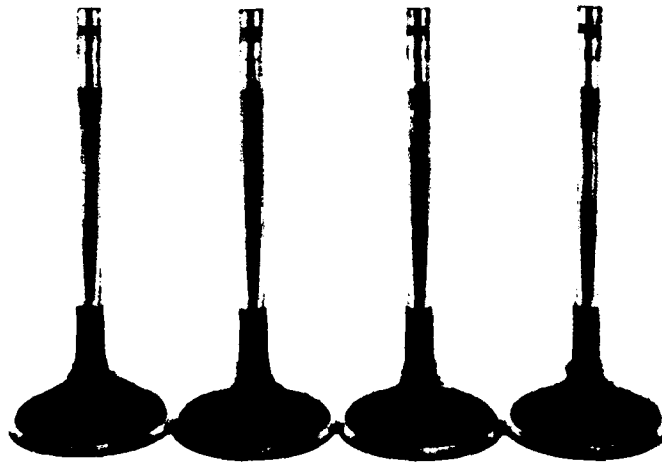


PISTON NO. 3 THRUST SIDE



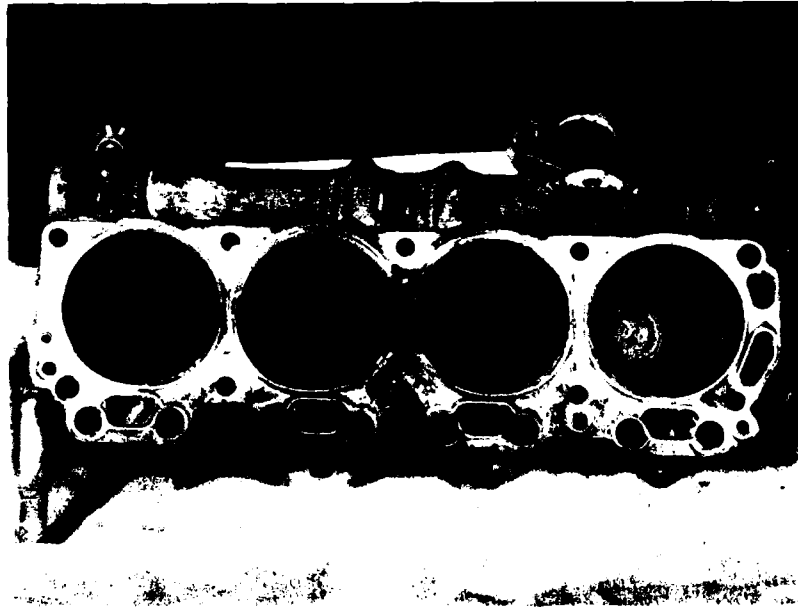
PISTON NO. 3 ANTI-THRUST SIDE

FT. BELVOIR, VA
ENGINE NO: 6003049 FUEL: GASOHOL

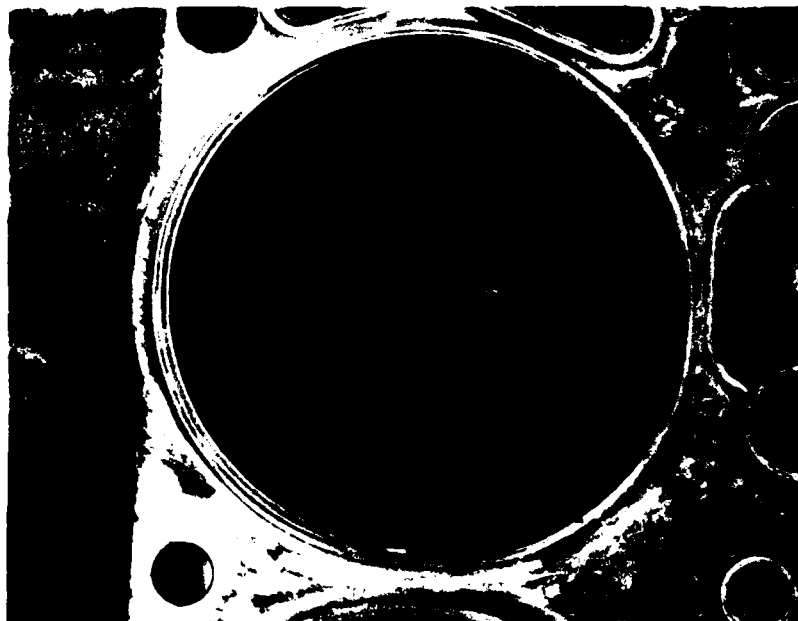


INTAKE VALVES 1-4

FT. BELVOIR, VA
ENGINE NO: 6003049 FUEL: GASOHOL



CYLINDER HEAD



CYLINDER HEAD COMBUSTION CHAMBER NO. 4

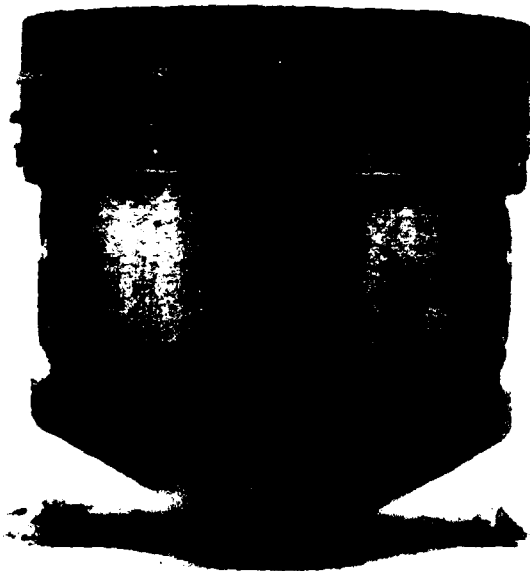
FT. BELVOIR, VA
ENGINE NO: 500283 FUEL: GASOHOL



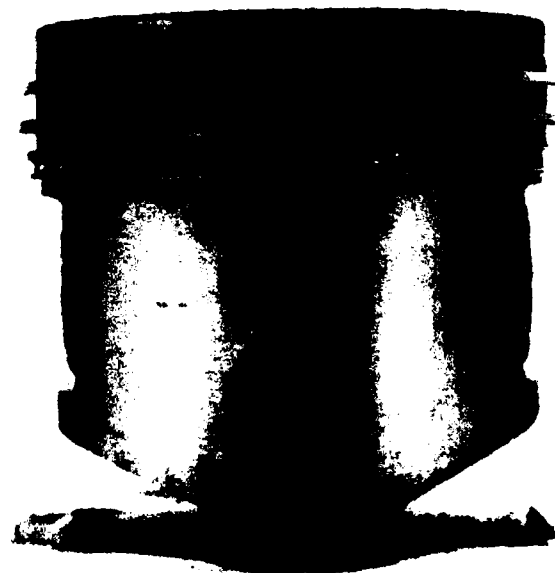
PISTON NO. 1 THRUST SIDE



PISTON NO. 1 ANTI-THRUST SIDE

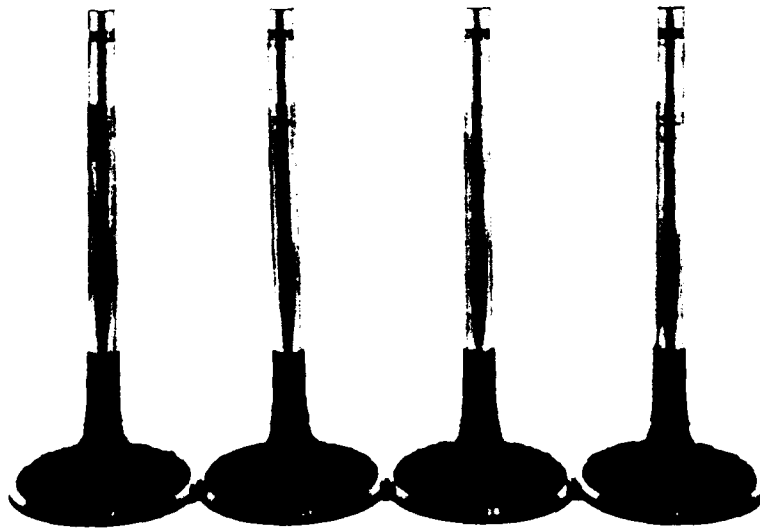


PISTON NO. 3 THRUST SIDE



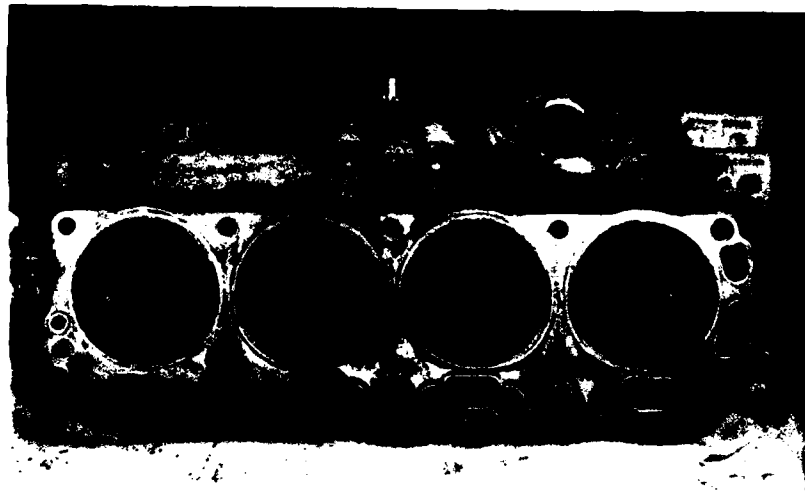
PISTON NO. 3 ANTI-THRUST SIDE

FT. BELVOIR, VA
ENGINE NO: 500283 FUEL: GASOHOL



INTAKE VALVES 1-4

FT. BELVOIR, VA
ENGINE NO: 500283 FUEL: GASOHOL



CYLINDER HEAD



CYLINDER HEAD COMBUSTION CHAMBER NO. 2

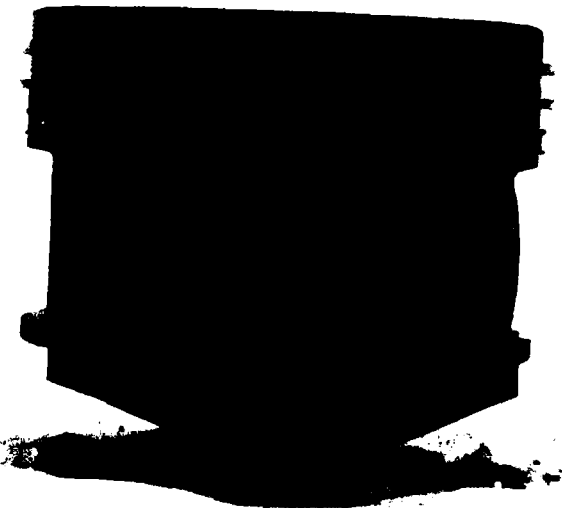
FT. BELVOIR, VA
ENGINE NO: 03223146 FUEL: UNLEADED GASOLINE



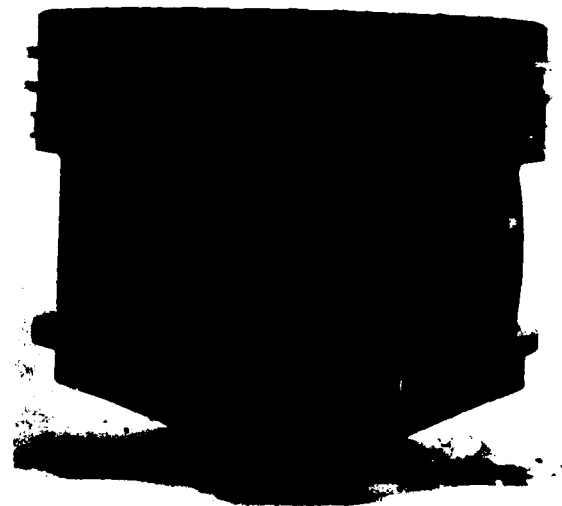
PISTON NO. 1 THRUST SIDE



PISTON NO. 1 ANTI-THRUST SIDE



PISTON NO. 3 THRUST SIDE



PISTON NO. 3 ANTI-THRUST SIDE

FT. BELVOIR, VA
ENGINE NO: 03223146 FUEL: UNLEADED GASOLINE



PISTON NO. 2 THRUST SIDE



PISTON NO. 2 ANTI-THRUST SIDE

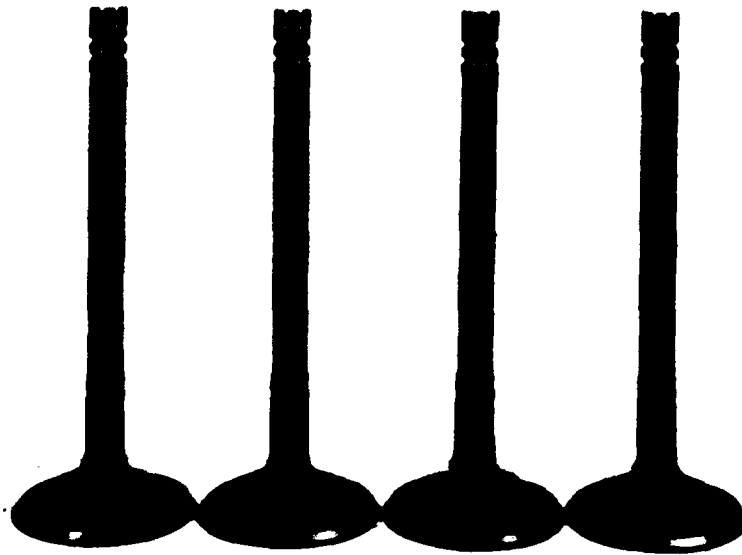


PISTON NO. 4 THRUST SIDE

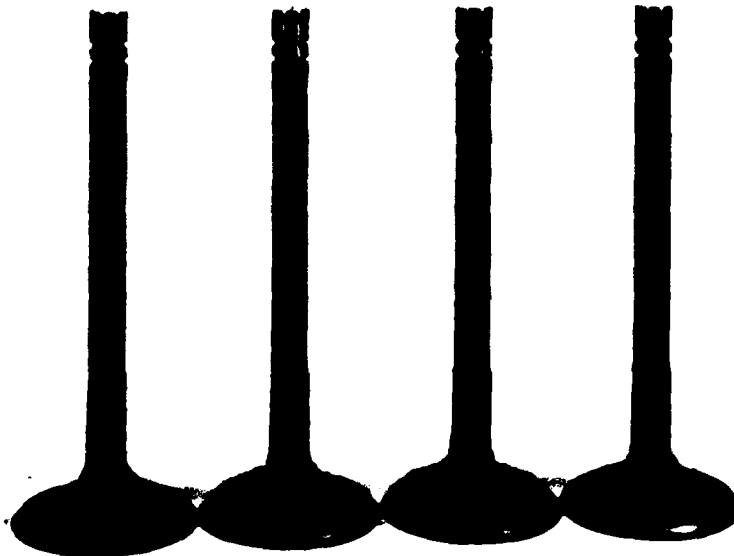


PISTON NO. 4 ANTI-THRUST SIDE

FT. BELVOIR, VA
ENGINE NO: 03223146 FUEL: UNLEADED GASOLINE

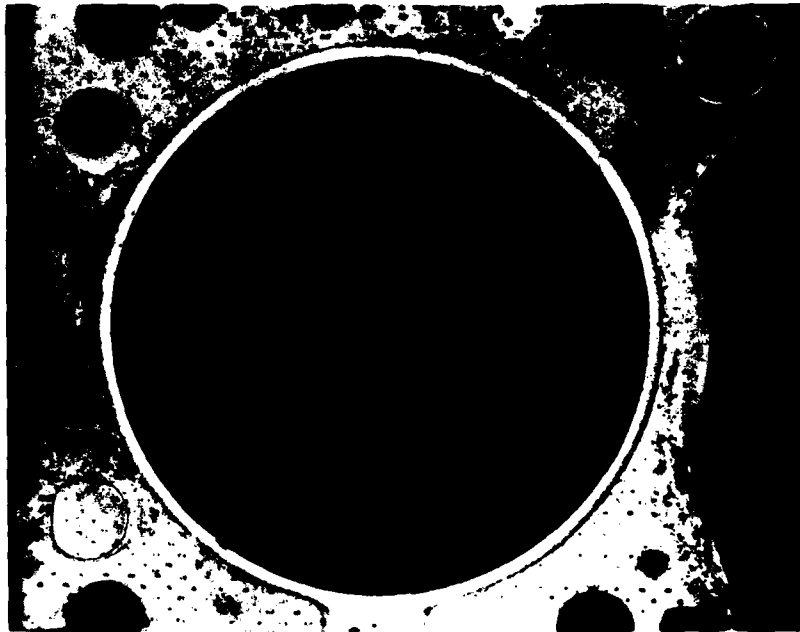


INTAKE VALVES 1-4 LEFT



INTAKE VALVES 1-4 RIGHT

FT. BELVOIR, VA
ENGINE NO: 03223146 FUEL: UNLEADED GASOLINE

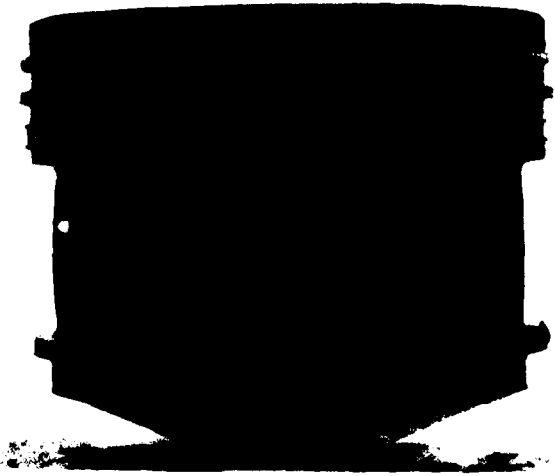


LEFT CYLINDER HEAD COMBUSTION CHAMBER NO. 1

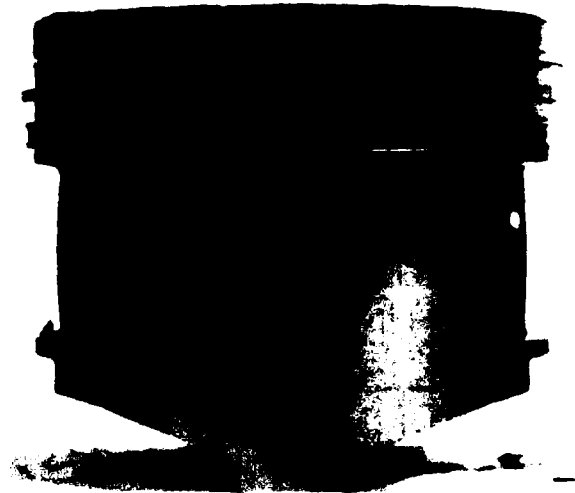


RIGHT CYLINDER HEAD COMBUSTION CHAMBER NO. 2

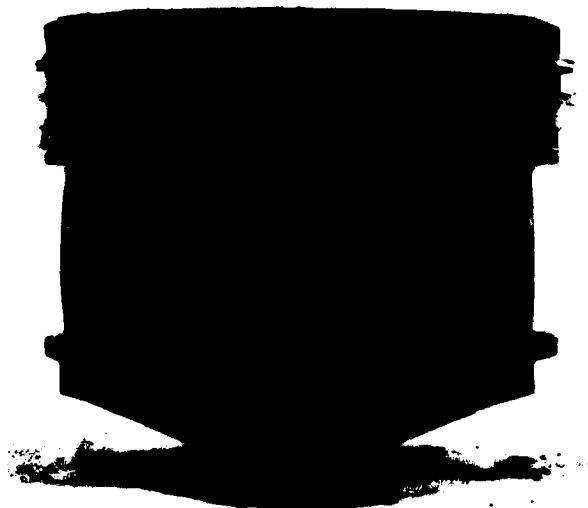
FT. BELVOIR, VA
ENGINE NO: 07121303 FUEL: GASOHOL



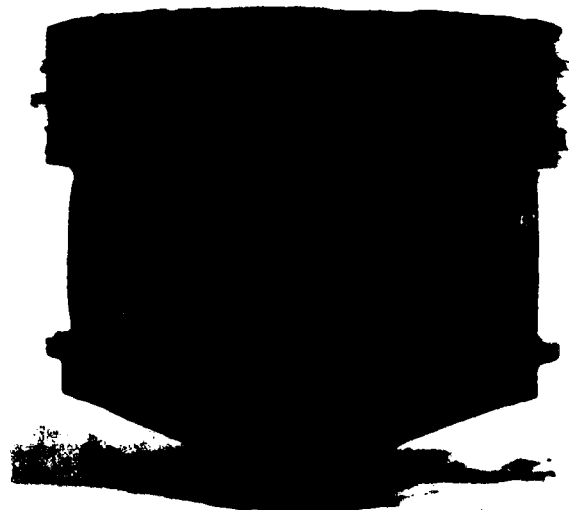
PISTON NO. 1 THRUST SIDE



PISTON NO. 1 ANTI-THRUST SIDE

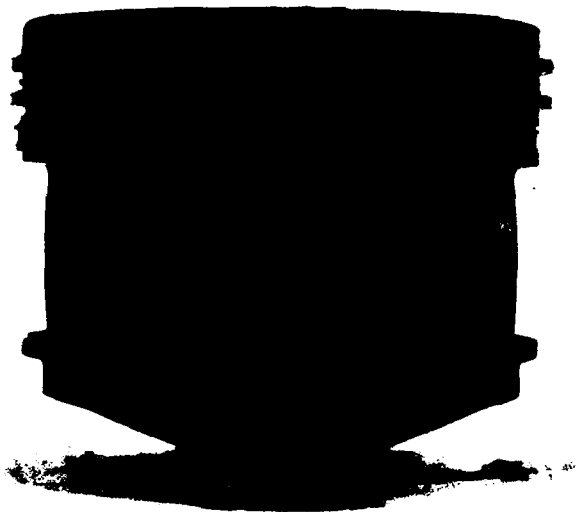


PISTON NO. 3 THRUST SIDE

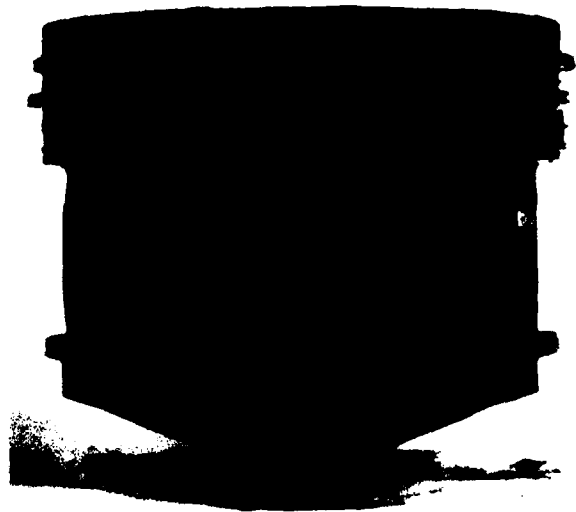


PISTON NO. 3 ANTI-THRUST SIDE

FT. BELVOIR, VA
ENGINE NO: 07121303 FUEL: GASOHOL



PISTON NO. 2 THRUST SIDE



PISTON NO. 2 ANTI-THRUST SIDE

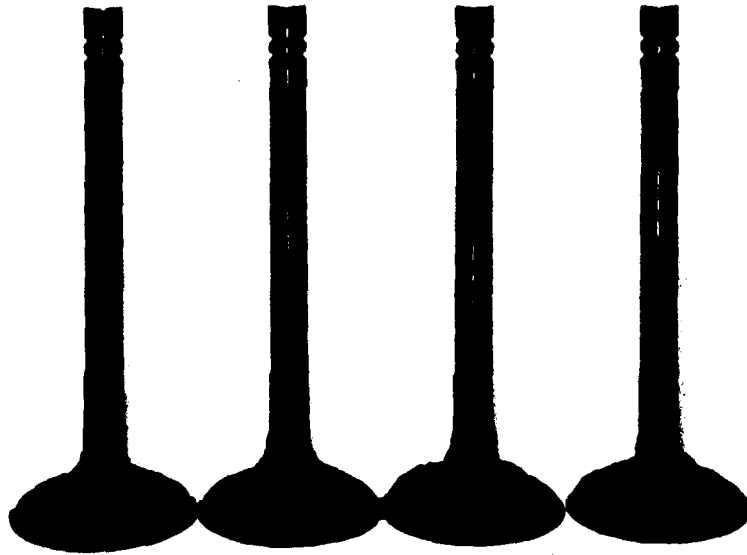


PISTON NO. 4 THRUST SIDE

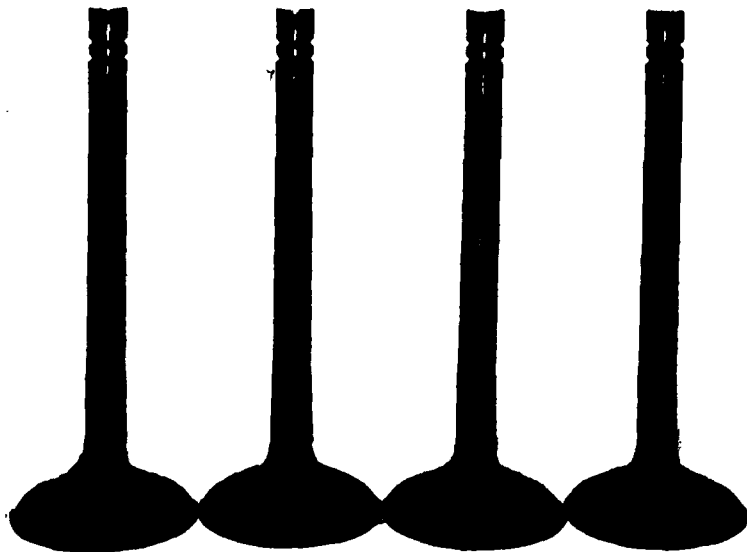


PISTON NO. 4 ANTI-THRUST SIDE

FT. BELVOIR, VA
ENGINE NO: 07121303 FUEL: GASOHOL

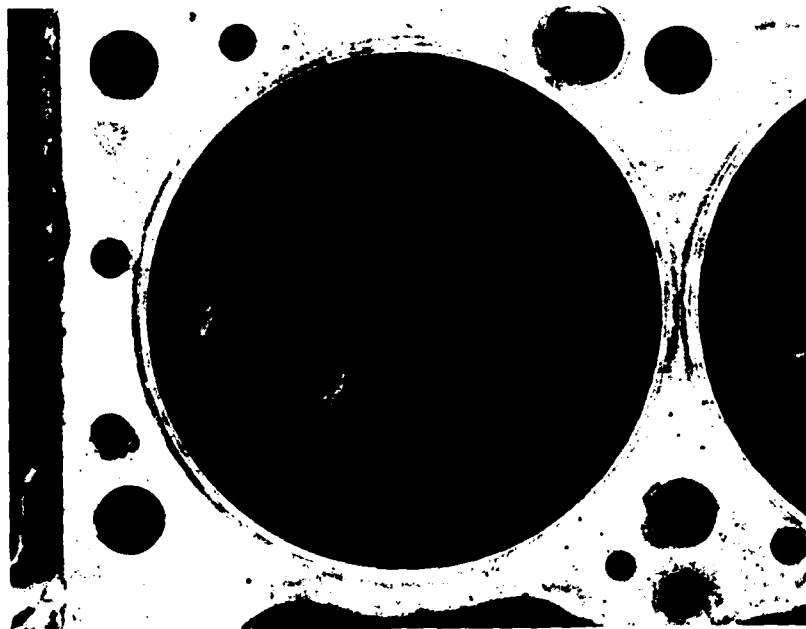


INTAKE VALVES 1-4 LEFT

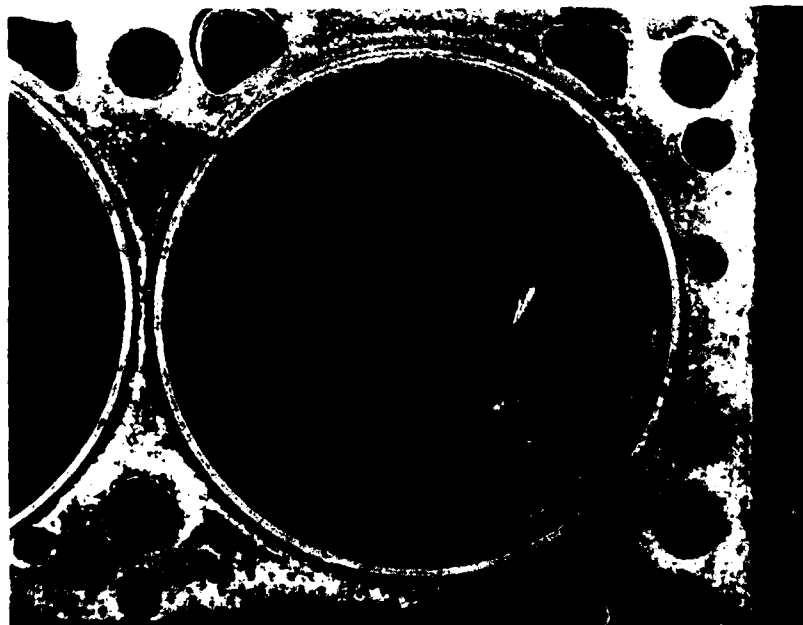


INTAKE VALVES 1-4 RIGHT

FT. BELVOIR, VA
ENGINE NO: 07121303 FUEL: GASOHOL

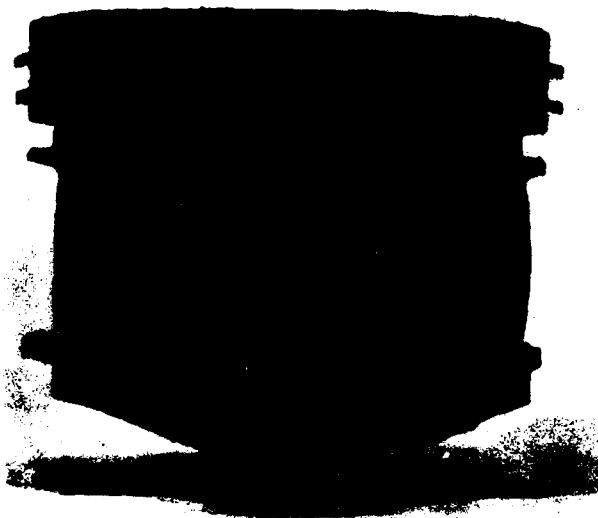


LEFT CYLINDER HEAD COMBUSTION CHAMBER NO. 1



RIGHT CYLINDER HEAD COMBUSTION CHAMBER NO. 2

FT. BELVOIR, VA
ENGINE NO: 07090311 FUEL: GASOHOL



PISTON NO. 1 THRUST SIDE



PISTON NO. 1 ANTI-THRUST SIDE



PISTON NO. 3 THRUST SIDE



PISTON NO. 3 ANTI-THRUST SIDE

FT. BELVOIR, VA
ENGINE NO: 07090311 FUEL: GASOHOL



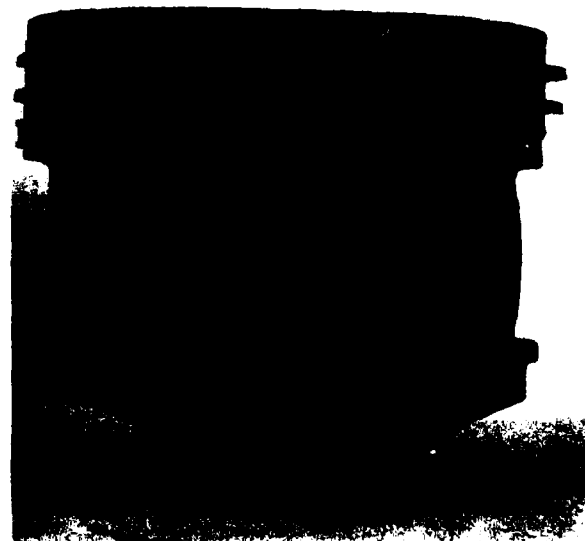
PISTON NO. 2 THRUST SIDE



PISTON NO. 2 ANTI-THRUST SIDE

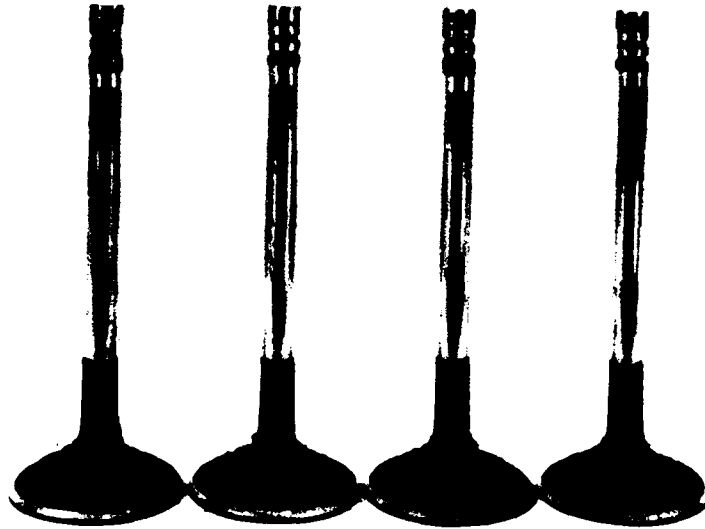


PISTON NO. 4 THRUST SIDE

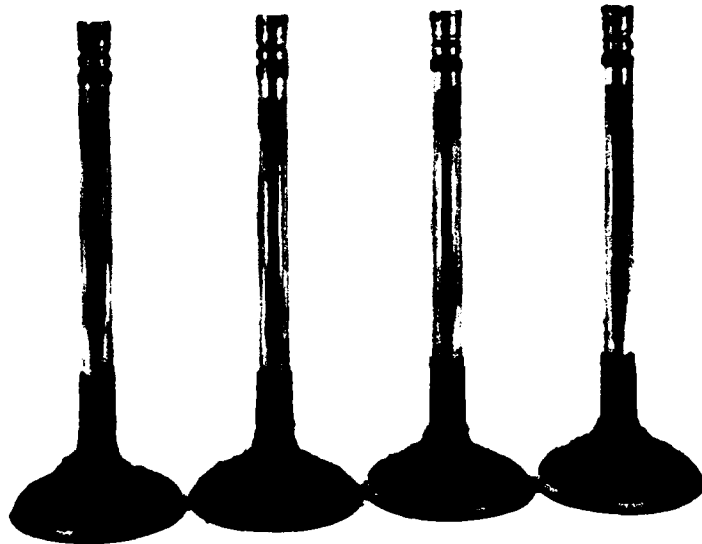


PISTON NO. 4 ANTI-THRUST SIDE

FT. BELVOIR, VA
ENGINE NO: 07090311 FUEL: GASOHOL

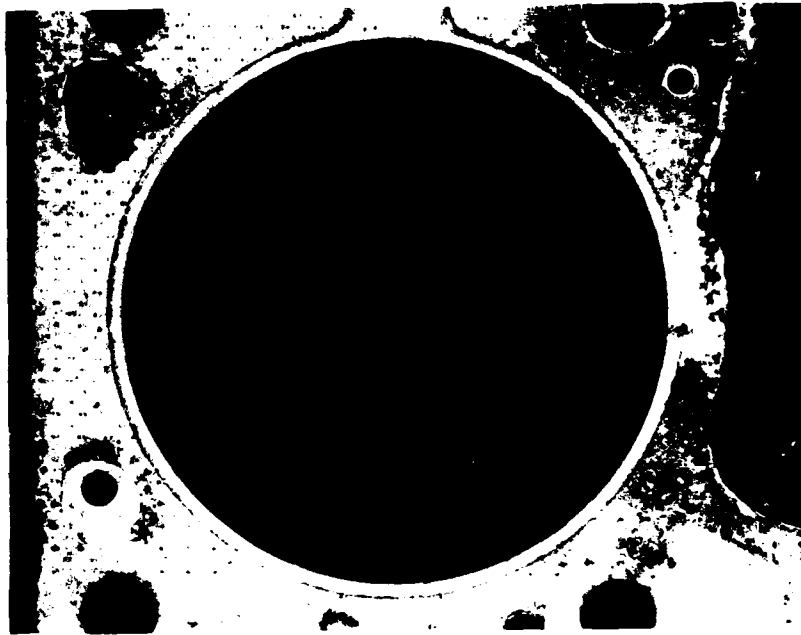


INTAKE VALVES 1-4 LEFT

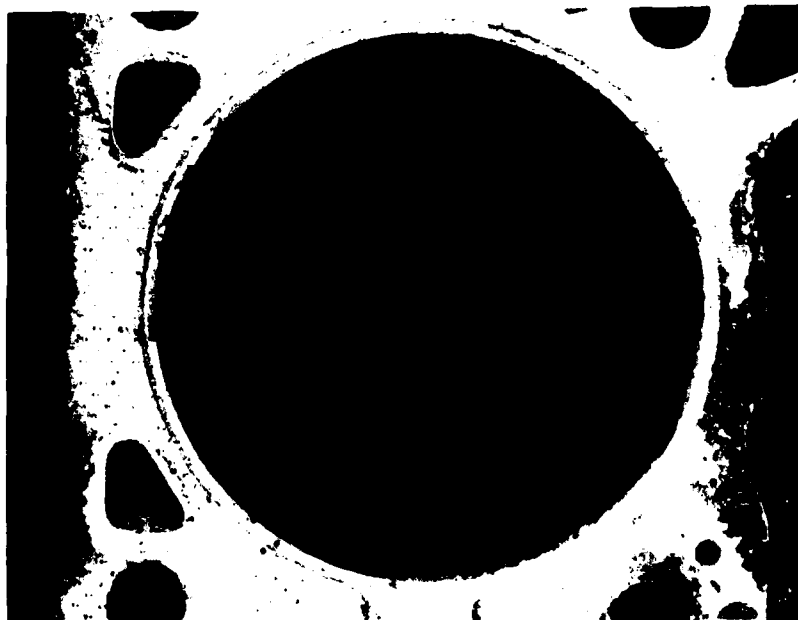


INTAKE VALVES 1-4 RIGHT

FT. BELVOIR, VA
ENGINE NO: 07090311 FUEL: GASOHOL

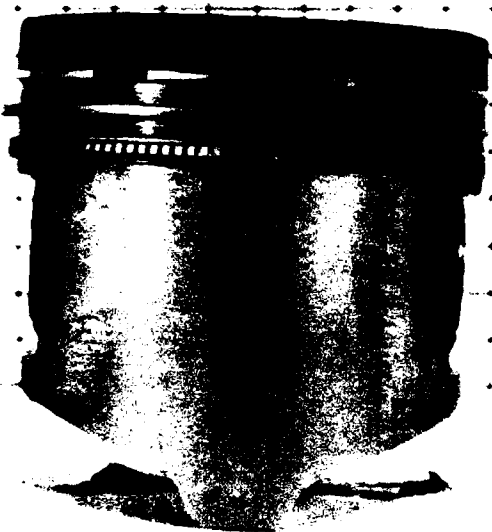


LEFT CYLINDER HEAD COMBUSTION CHAMBER NO. 1



RIGHT CYLINDER HEAD COMBUSTION CHAMBER NO. 2

FT. LEWIS, WA
ENGINE NO: 235880 FUEL: UNLEADED GASOLINE



PISTON NO. 1 THRUST SIDE



PISTON NO. 1 ANTI-THRUST SIDE

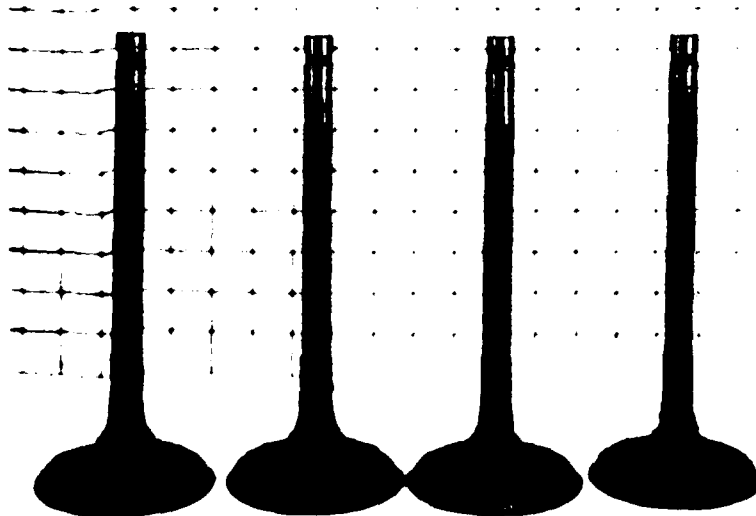


PISTON NO. 2 THRUST SIDE

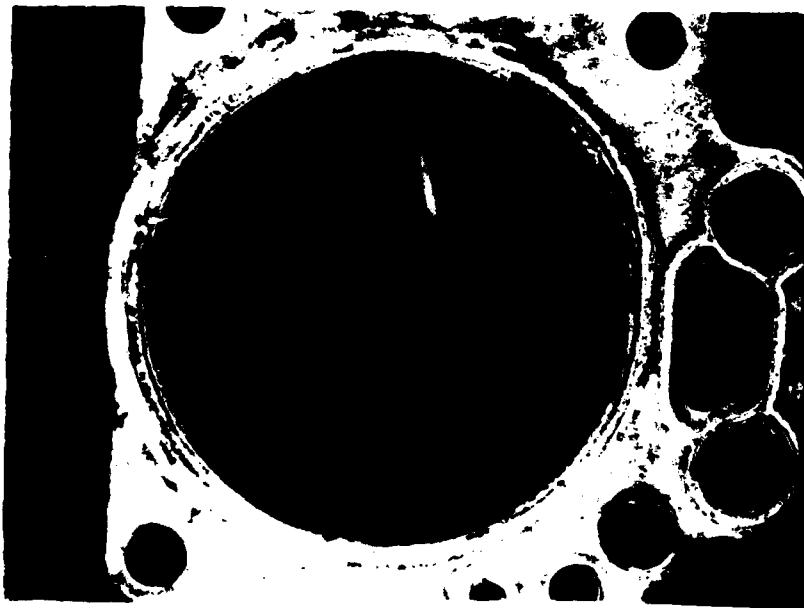


PISTON NO. 2 ANTI-THRUST SIDE

FT. LEWIS, WA
ENGINE NO: 235880 FUEL: UNLEADED GASOLINE



INTAKE VALVES 1-4

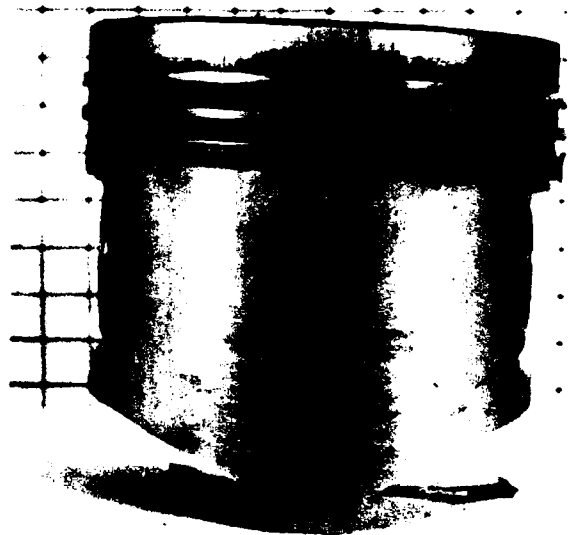


CYLINDER HEAD COMBUSTION CHAMBER NO. 1

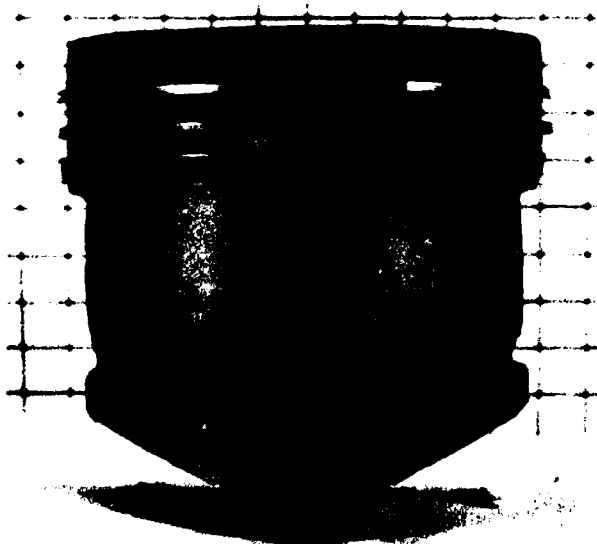
FT. LEWIS, WA
ENGINE NO: 251891 FUEL: GASOHOL



PISTON NO. 1 THRUST SIDE



PISTON NO. 1 ANTI-THRUST SIDE

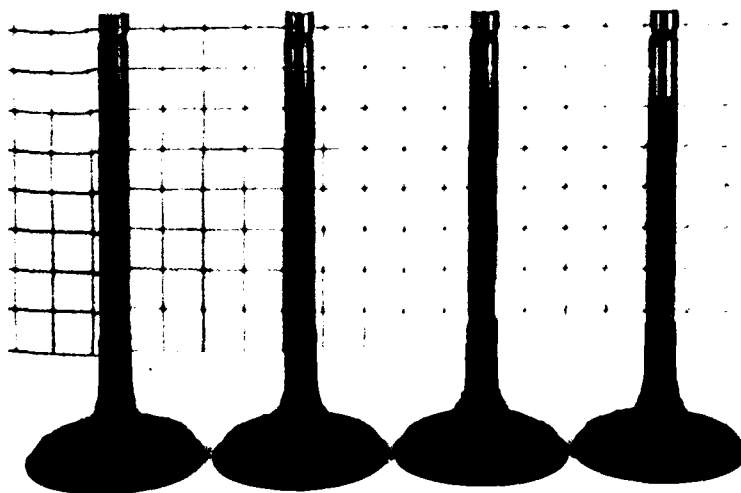


PISTON NO. 2 THRUST SIDE

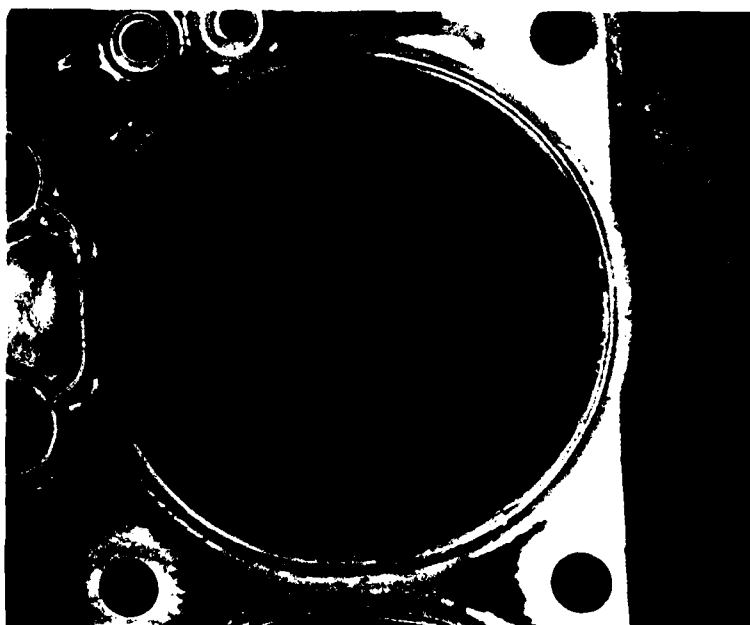


PISTON NO. 2 ANTI-THRUST SIDE

FT. LEWIS, WA
ENGINE NO: 251891 FUEL: GASOHOL



INTAKE VALVES 1-4



CYLINDER HEAD COMBUSTION CHAMBER NO. 1

FT. LEWIS, WA
ENGINE NO: 235875 FUEL: GASOHOL



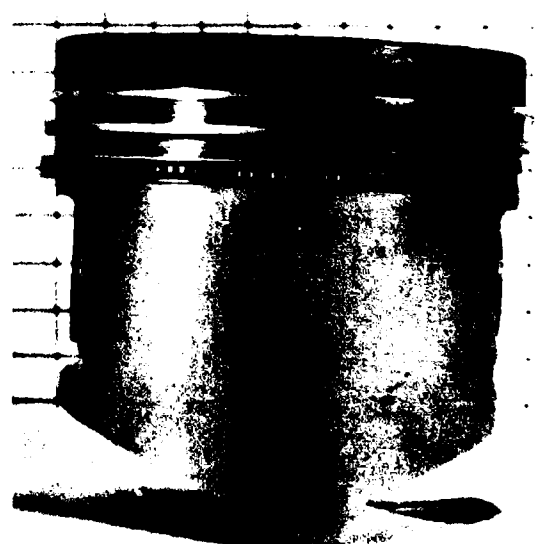
PISTON NO. 1 THRUST SIDE



PISTON NO. 1 ANTI-THRUST SIDE

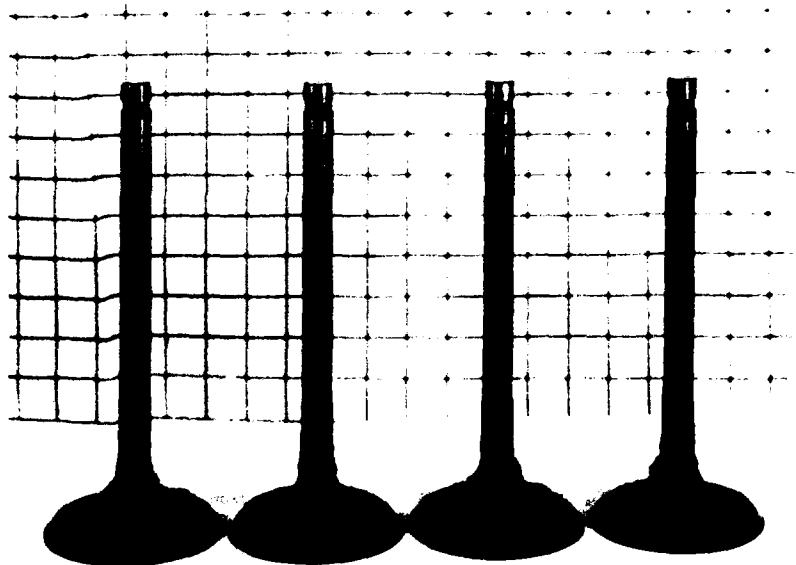


PISTON NO. 2 THRUST SIDE

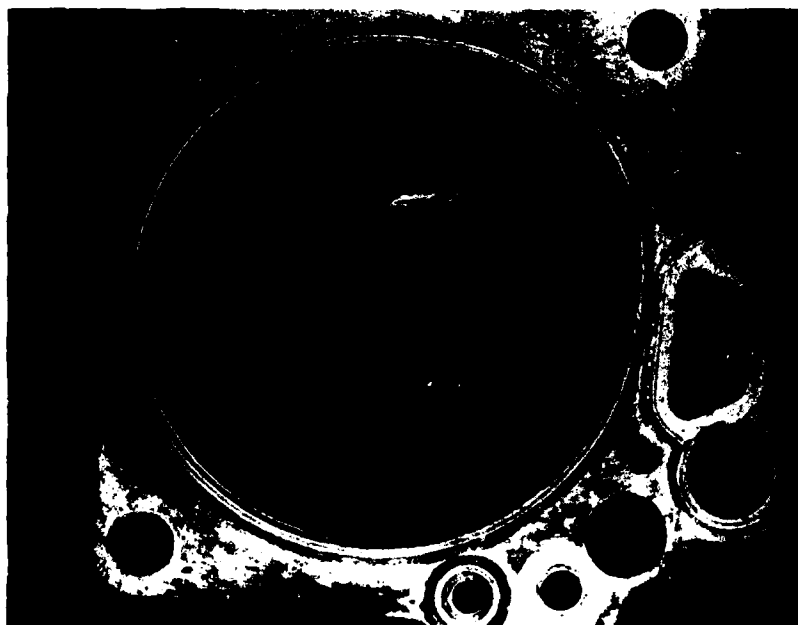


PISTON NO. 2 ANTI-THRUST SIDE

FT. LEWIS, WA
ENGINE NO: 235875 FUEL: GASOHOL

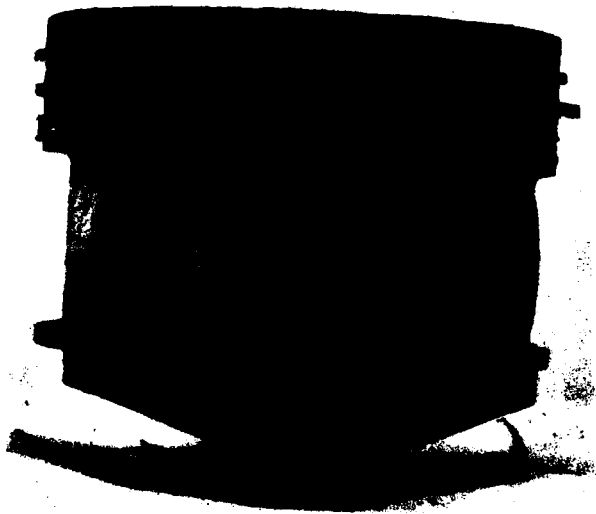


INTAKE VALVES 1-4



CYLINDER HEAD COMBUSTION CHAMBER NO. 1

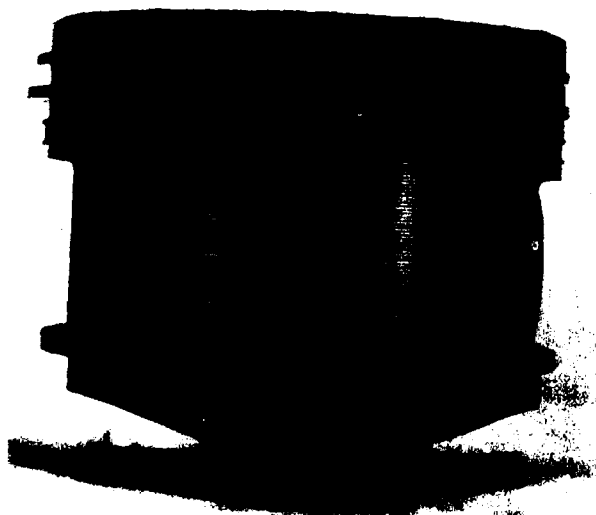
FT. LEWIS, WA
ENGINE NO: 01212997 FUEL: UNLEADED GASOLINE



PISTON NO. 1 THRUST SIDE



PISTON NO. 1 ANTI-THRUST SIDE

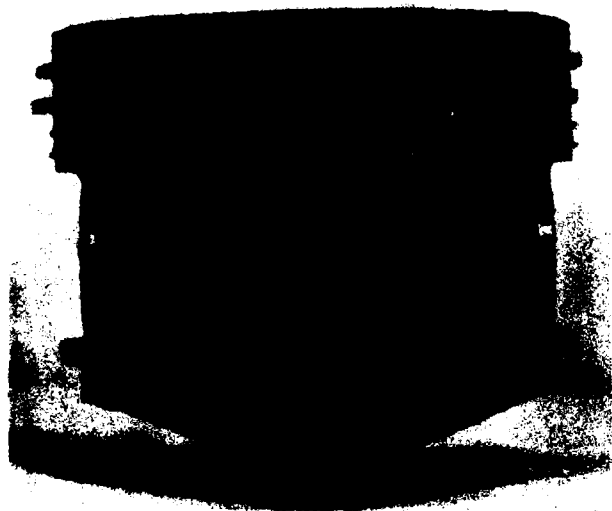


PISTON NO. 3 THRUST SIDE

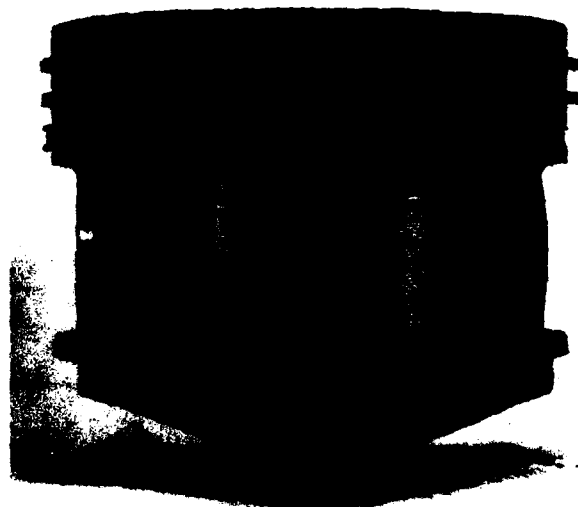


PISTON NO. 3 ANTI-THRUST SIDE

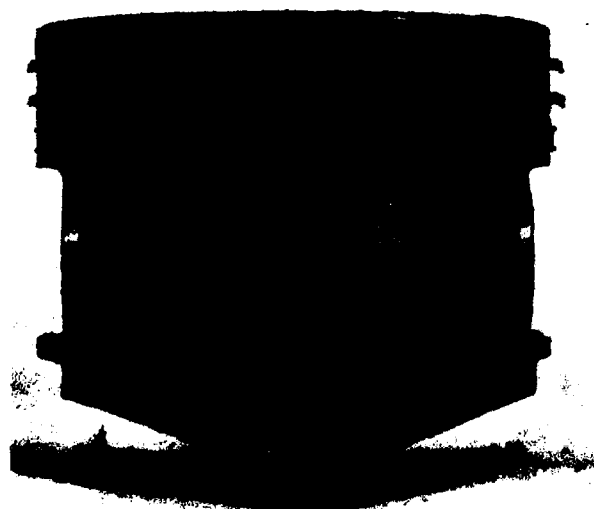
FT. LEWIS, WA
ENGINE NO: 01212997 FUEL: UNLEADED GASOLINE



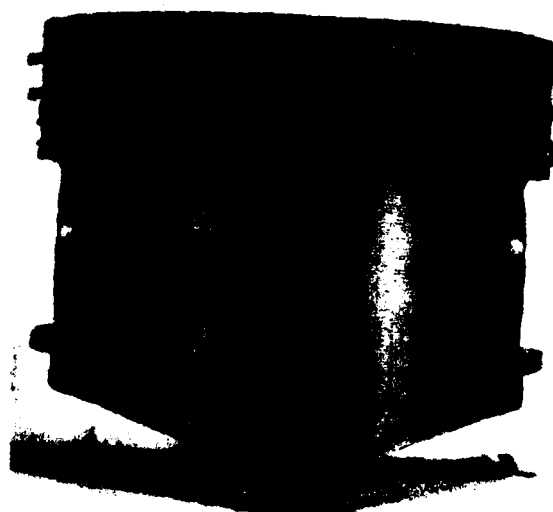
PISTON NO. 2 THRUST SIDE



PISTON NO. 2 ANTI-THRUST SIDE

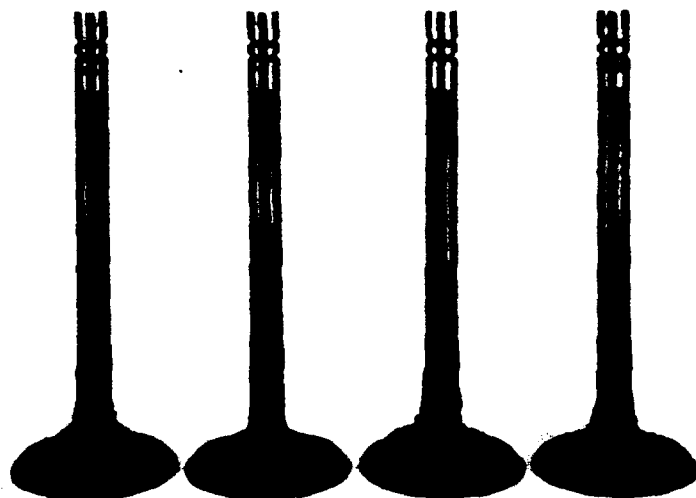


PISTON NO. 6 THRUST SIDE

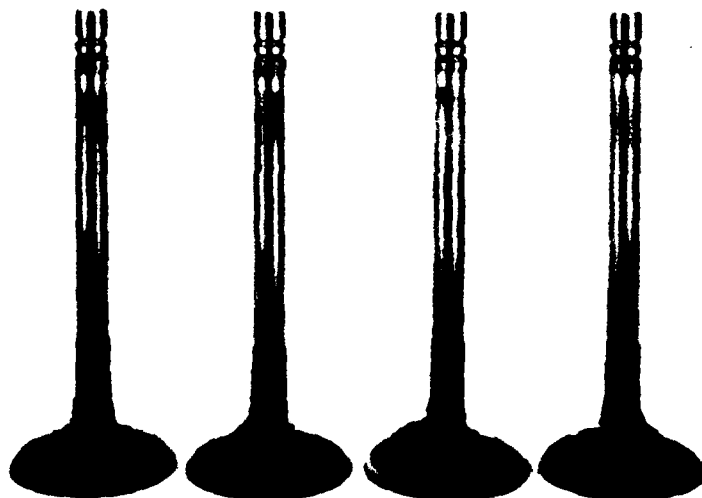


PISTON NO. 6 ANTI-THRUST SIDE

FT. LEWIS, WA
ENGINE NO: 01212997 FUEL: UNLEADED GASOLINE

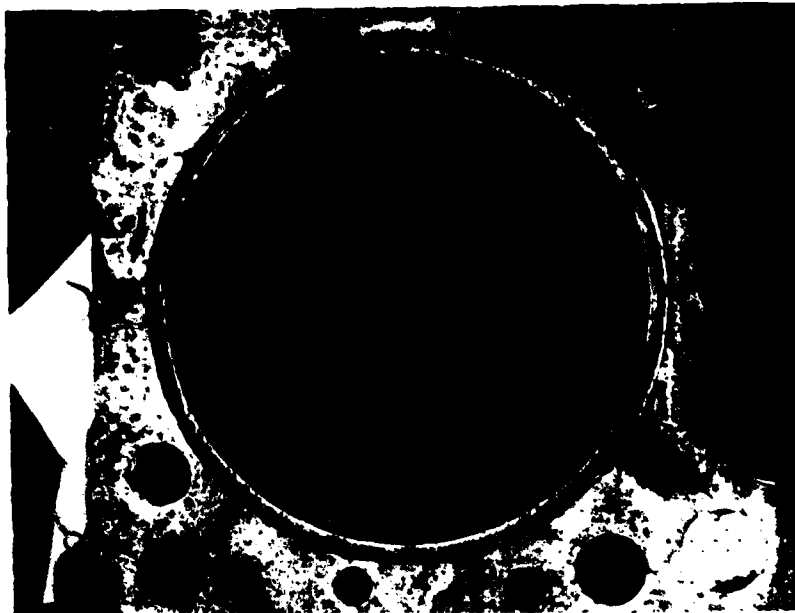


INTAKE VALVES 1,3,5,7 LEFT

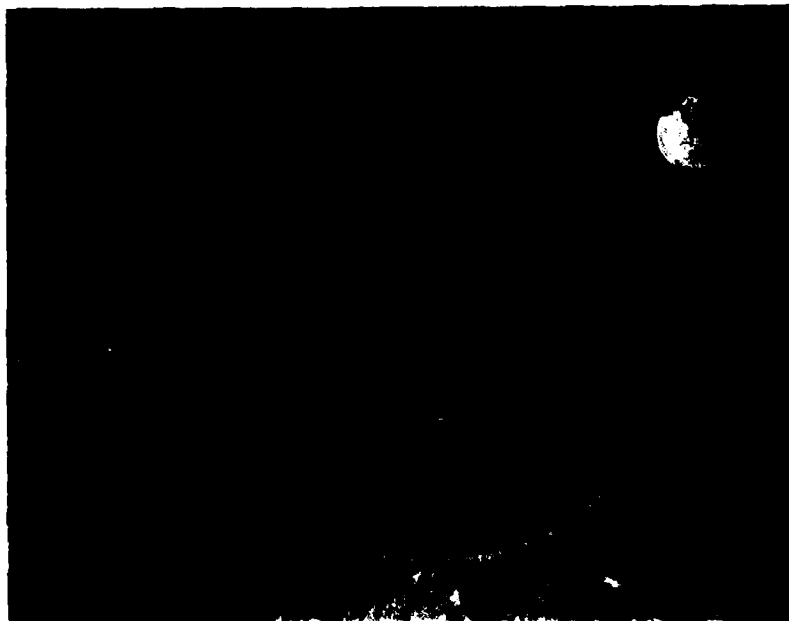


INTAKE VALVES 2,3,6,8, RIGHT

FT. LEWIS, WA
ENGINE NO: 01212997 FUEL: UNLEADED GASOLINE



LEFT CYLINDER HEAD COMBUSTION CHAMBER NO. 1



RIGHT CYLINDER HEAD COMBUSTION CHAMBER NO. 2

FT. LEWIS, WA
ENGINE NO. 01212997 FUEL: UNLEADED GASOLINE

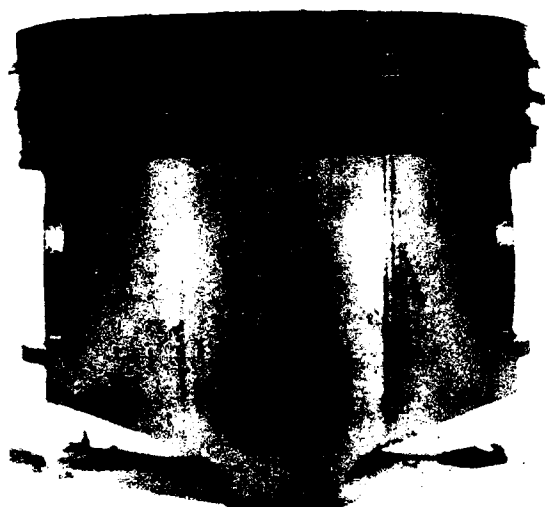


CYLINDER HEAD LEFT

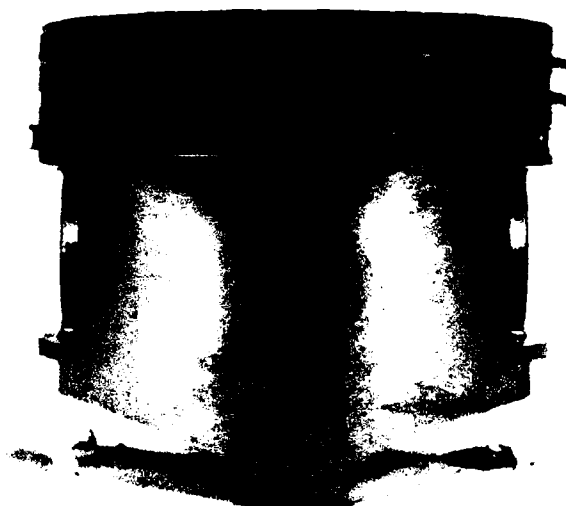


CYLINDER HEAD RIGHT

FT. LEWIS, WA
ENGINE NO: 02260516 FUEL: GASOHOL



PISTON NO. 1 THRUST SIDE



PISTON NO. 1 ANTI-THRUST SIDE

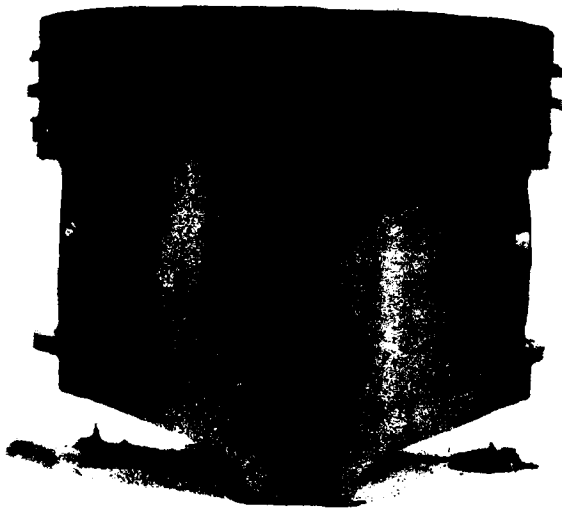


PISTON NO. 3 THRUST SIDE

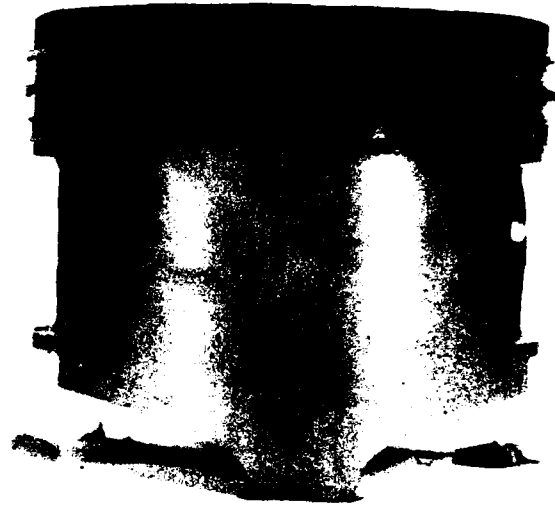


PISTON NO. 3 ANTI-THRUST SIDE

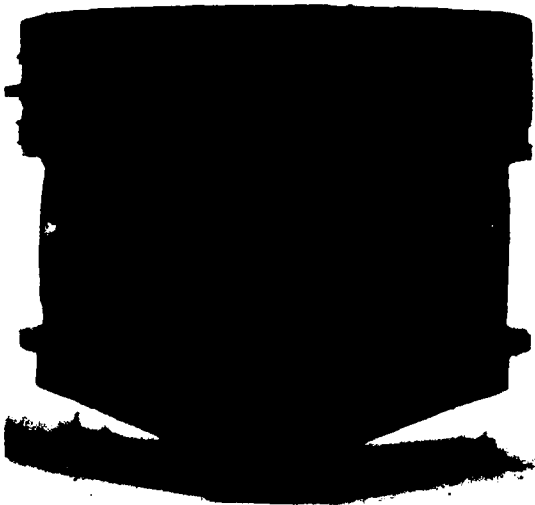
FT. LEWIS, WA
ENGINE NO: 02260516 FUEL: GASOHOL



PISTON NO. 2 THRUST SIDE



PISTON NO. 2 ANTI-THRUST SIDE

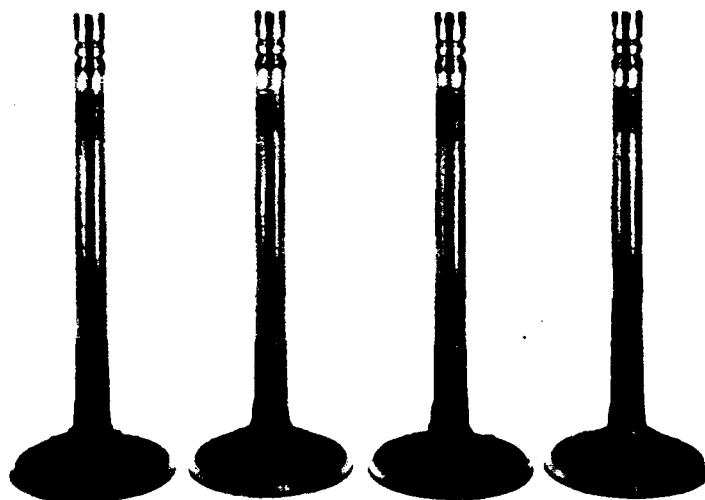


PISTON NO. 6 THRUST SIDE

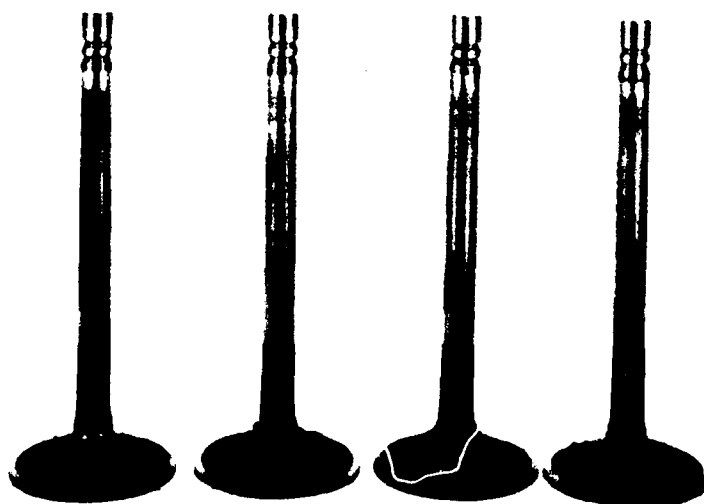


PISTON NO. 6 ANTI-THRUST SIDE

FT. LEWIS, WA
ENGINE NO: 02260516 FUEL: GASOHOL

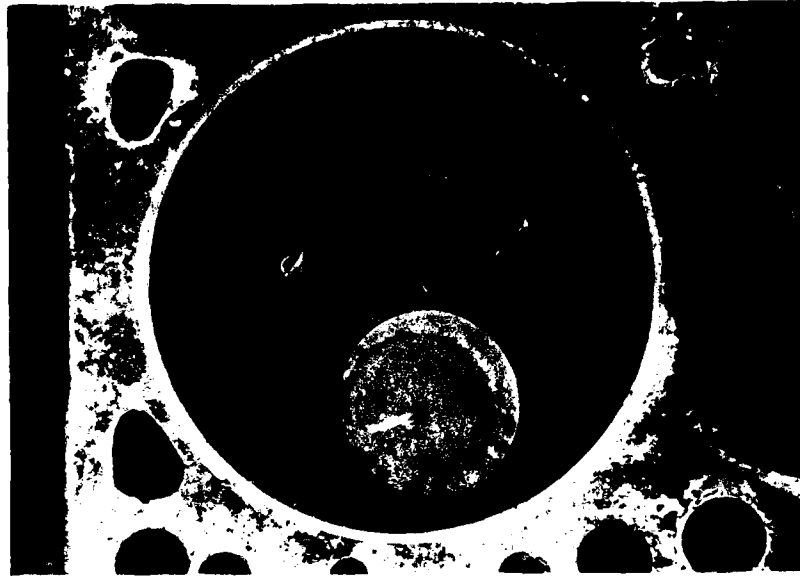


INTAKE VALVES 1,3,5,7, LEFT

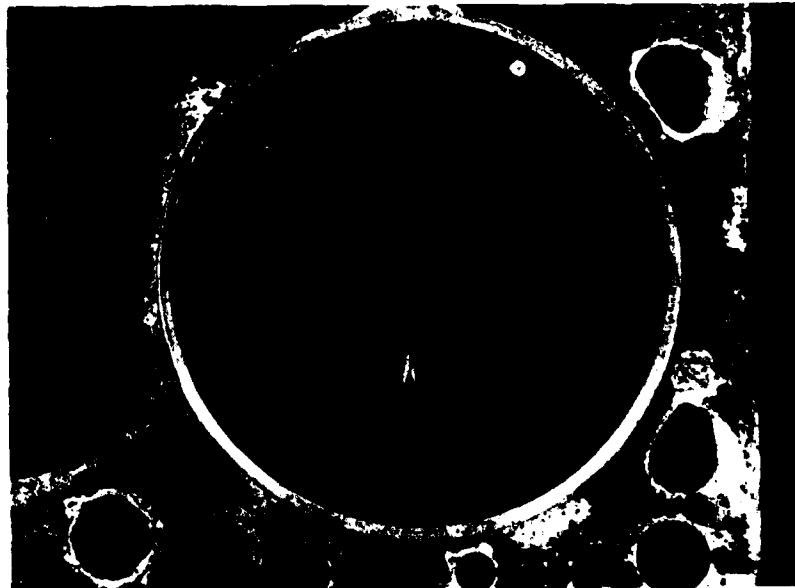


INTAKE VALVES 2,4,6,8 RIGHT

FT. LEWIS, WA
ENGINE NO: 02260516 FUEL: GASOHOL



LEFT CYLINDER HEAD COMBUSTION CHAMBER NO. 1



RIGHT CYLINDER HEAD COMBUSTION CHAMBER NO. 2

AD-A137 312

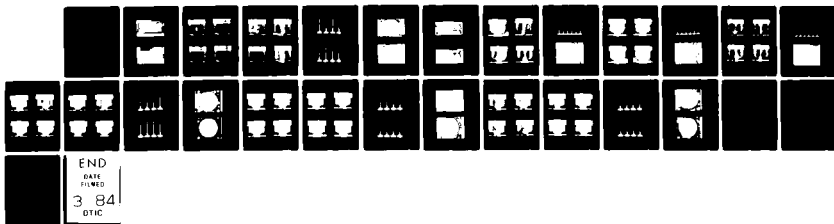
AFTER-TEST ENGINE INSPECTION OF US ARMY ADMINISTRATIVE
AND LIGHT-TACTICAL..(U) SOUTHWEST RESEARCH INST SAN
ANTONIO TX ARMY FUELS AND LUBRICA.. W E BUTLER ET AL.
FEB 83 AFLRL-167 DAAK70-82-C-0001

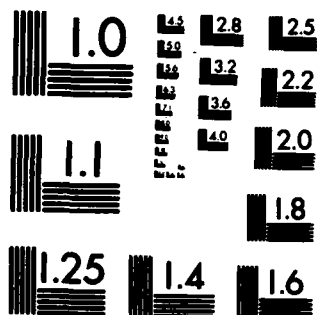
2/2

UNCLASSIFIED

F/G 21/7

NL





MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

FT. LEWIS, WA
ENGINE NO: 02260516 FUEL: GASOHOL

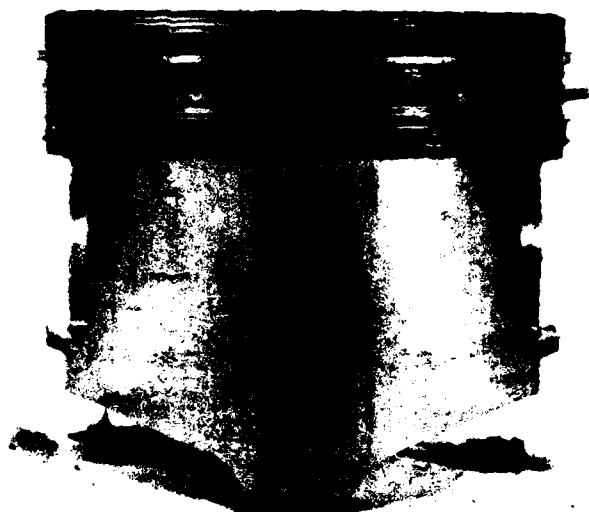


CYLINDER HEAD LEFT



CYLINDER HEAD RIGHT

FT. LEWIS, WA
ENGINE NO: 12110971 FUEL: GASOHOL



PISTON NO. 1 THRUST SIDE



PISTON NO. 1 ANTI-THRUST SIDE

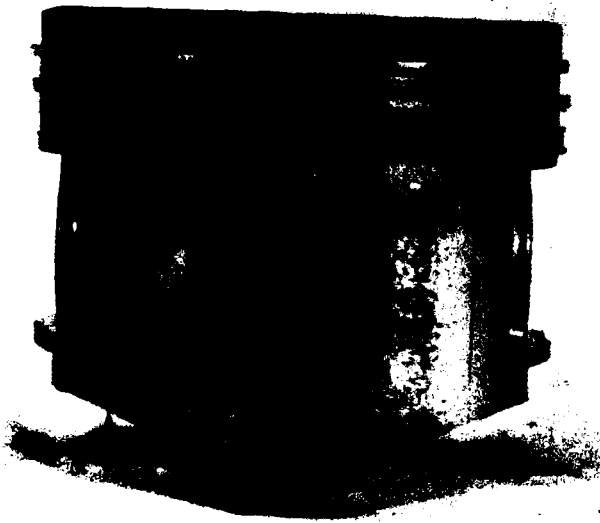


PISTON NO. 3 THRUST SIDE

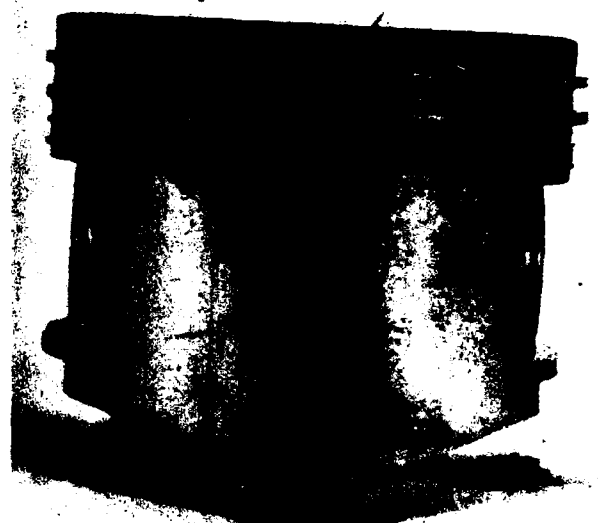


PISTON NO. 3 ANTI-THRUST SIDE

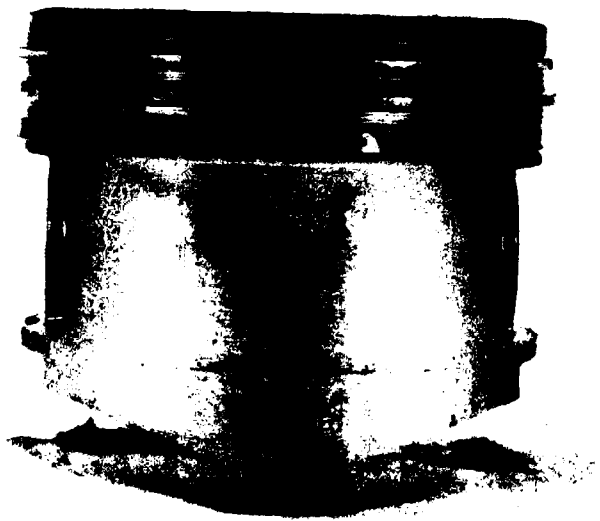
FT. LEWIS, WA
ENGINE NO: 12110971 FUEL: GASOHOL



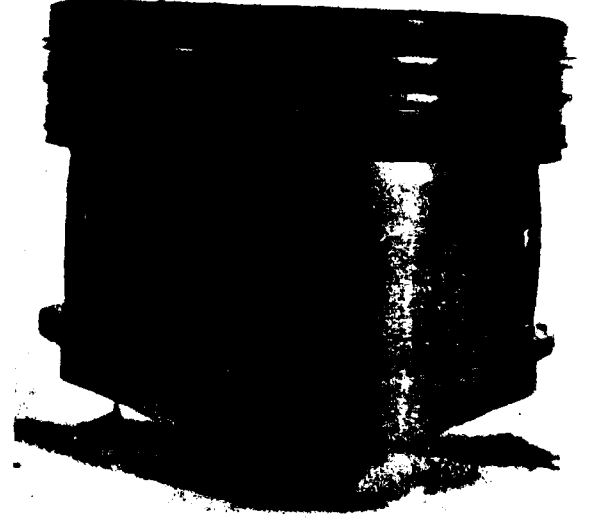
PISTON NO. 2 THRUST SIDE



PISTON NO. 2 ANTI-THRUST SIDE

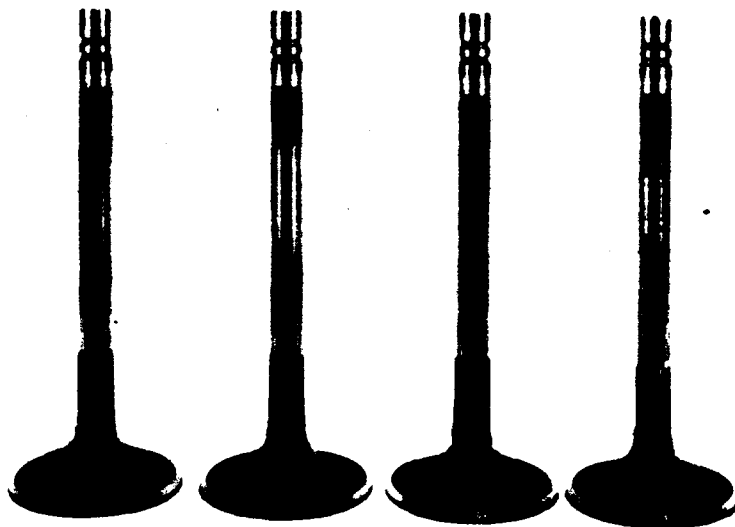


PISTON NO. 6 THRUST SIDE

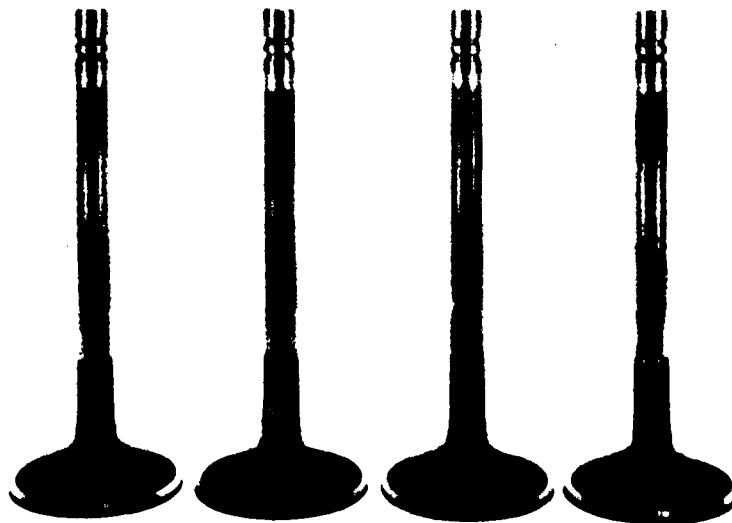


PISTON NO. 6 ANTI-THRUST SIDE

FT. LEWIS, WA
ENGINE NO: 12110971 FUEL: GASOHOL



INTAKE VALVES 1,3,5,7, LEFT

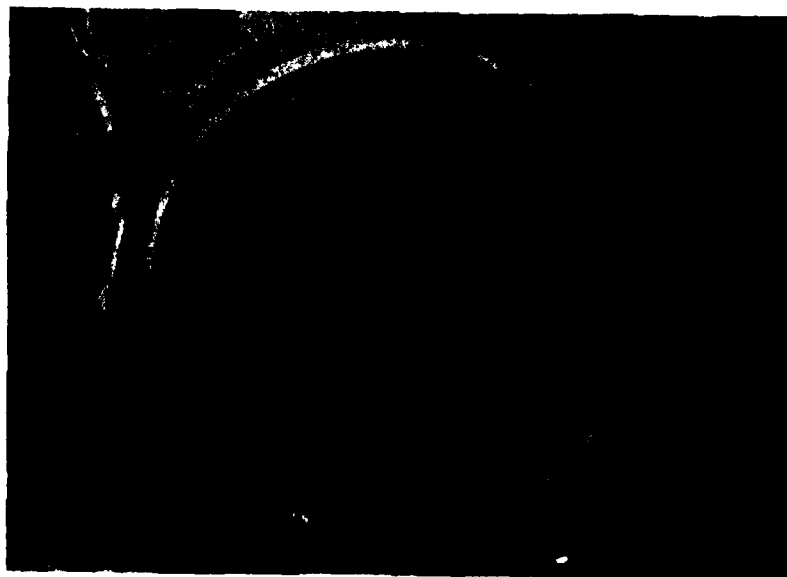


INTAKE VALVES 2,4,6,8, RIGHT

FT. LEWIS, WA
ENGINE NO: 12110971 FUEL: GASOHOL



LEFT CYLINDER HEAD COMBUSTON CHAMBER NO. 1



RIGHT CYLINDER HEAD COMBUSTION CHAMBER NO. 2

FT. LEWIS, WA
ENGINE NO: 12110971 FUEL: GASOHOL



CYLINDER HEAD LEFT



CYLINDER HEAD RIGHT

FT. McCOY, WI
ENGINE NO: CD0941 FUEL: UNLEADED GASOLINE



PISTON NO. 1 THRUST SIDE



PISTON NO. 1 ANTI-THRUST SIDE

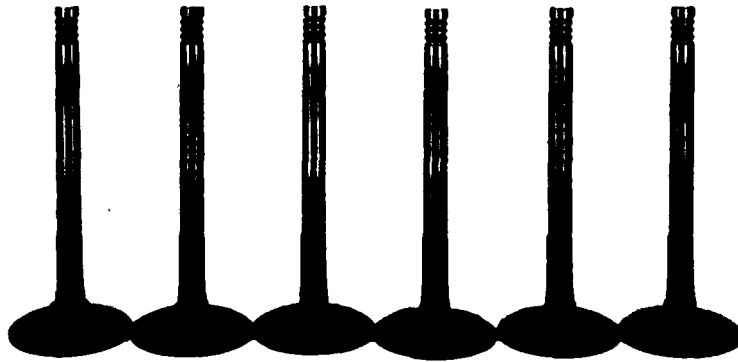


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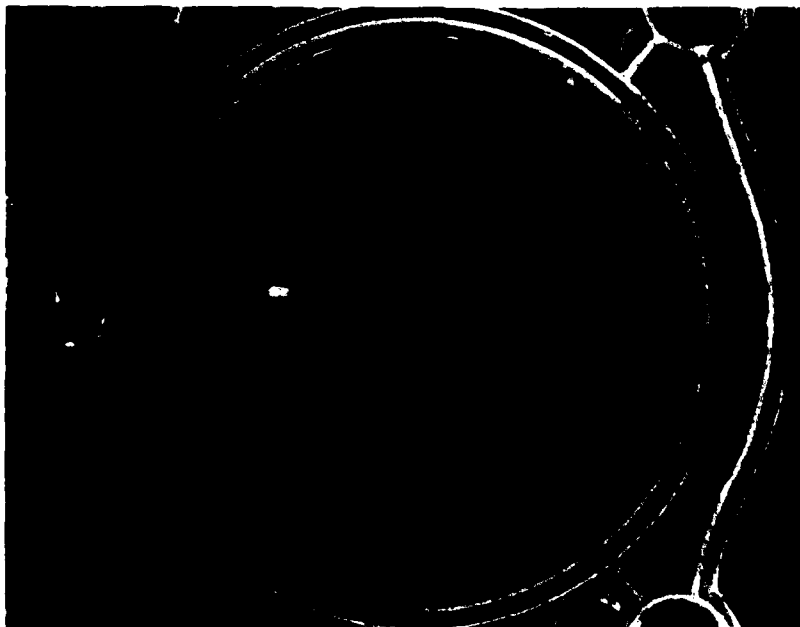


PISTON NO. 4 ANTI-THRUST SIDE

FT. McCOY, WI
ENGINE NO: CD0941 FUEL: UNLEADED GASOLINE

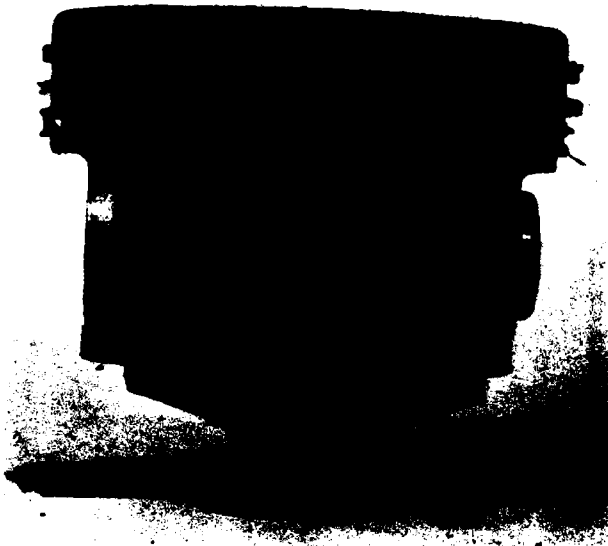


INTAKE VALVES 1-6

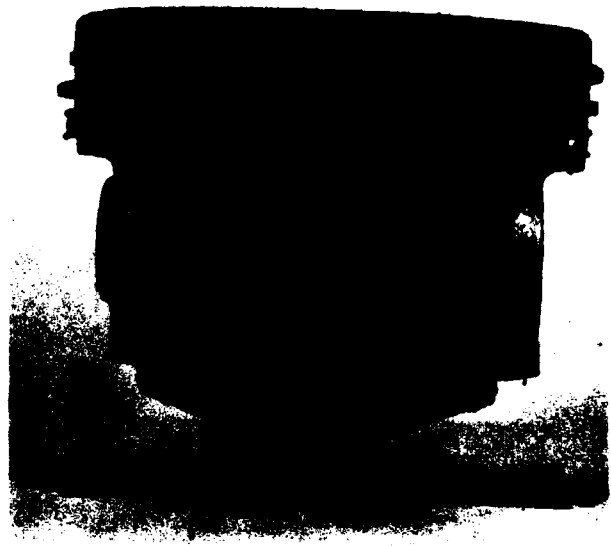


CYLINDER HEAD COMBUSTION CHAMBER NO. 1

FT. McCOY, WI
ENGINE NO: CD0935 FUEL: GASOHOL



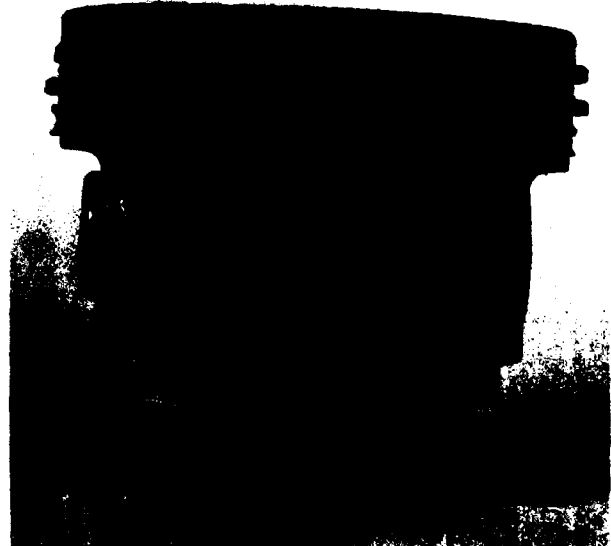
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PISTON NO. 1 ANTI-THRUST SIDE

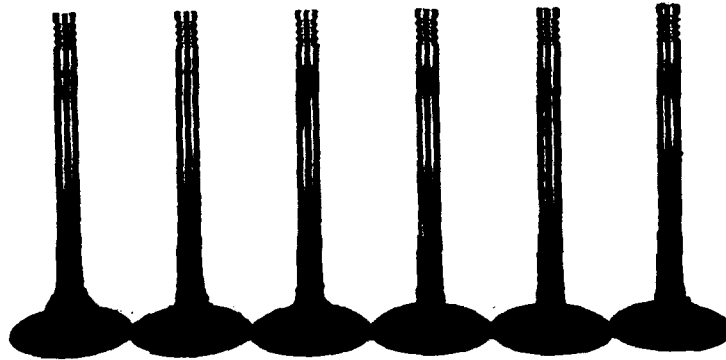


PISTON NO. 4 THRUST SIDE



PISTON NO. 4 ANTI-THRUST SIDE

FT. McCOY, WI
ENGINE NO: CD0935 FUEL: GASOHOL

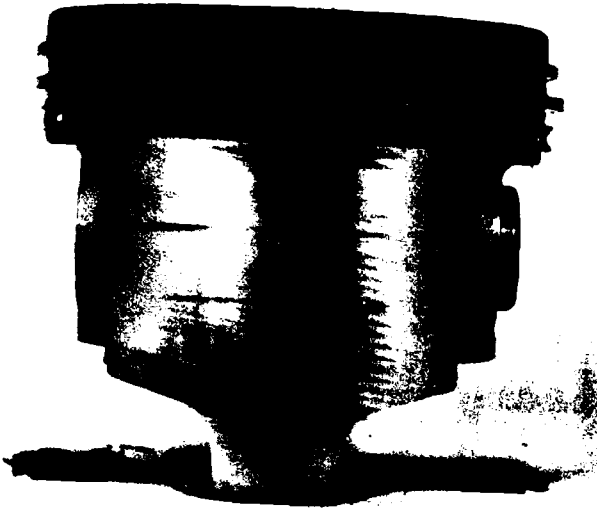


INTAKE VALVES 1-6

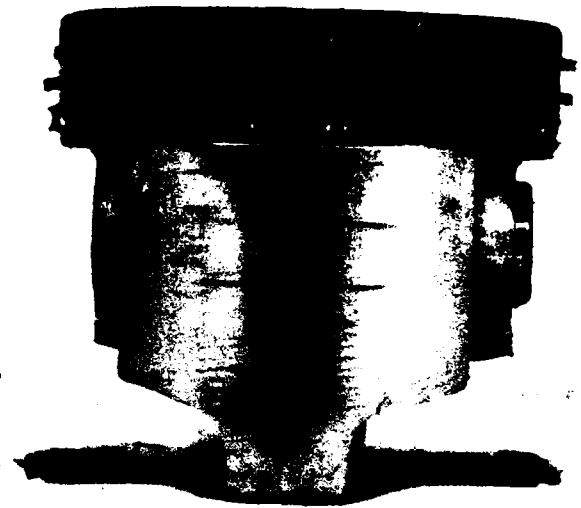


CYLINDER HEAD COMBUSTION CHAMBER NO. 1

FT. McCOY, WI
ENGINE NO: CD0939 FUEL: GASOHOL



PISTON NO. 1 THRUST SIDE



PISTON NO. 1 ANTI-THRUST SIDE

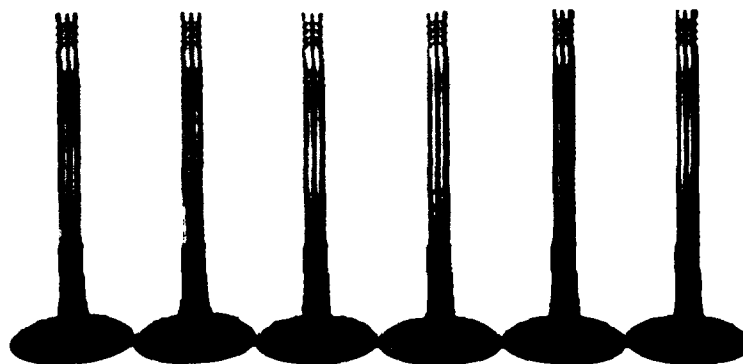


PISTON NO. 4 THRUST SIDE



PISTON NO. 4 ANTI-THRUST SIDE

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ENGINE NO: CD0939 FUEL: GASOHOL

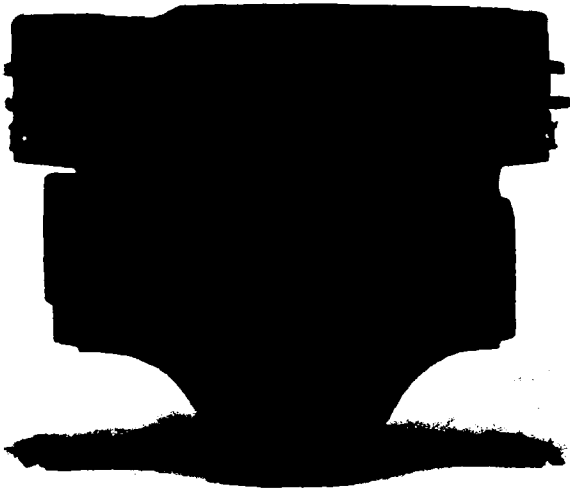


INTAKE VALVES 1-6

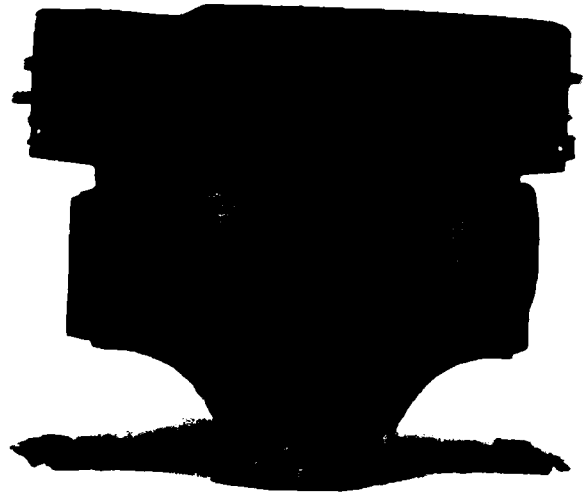


CYLINDER HEAD COMBUSTION CHAMBER NO. 1

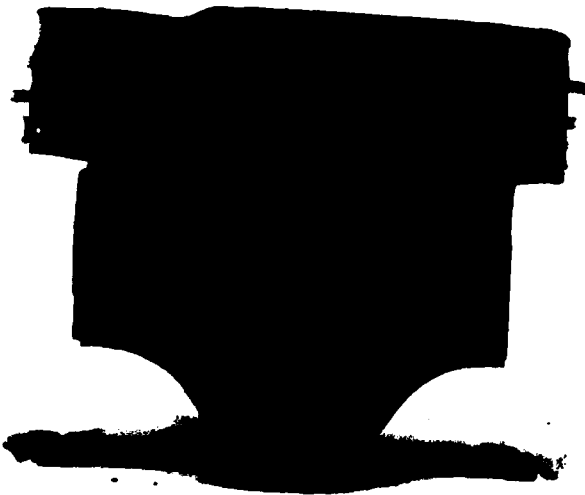
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ENGINE NO: CD7099 FUEL: GASOHOL



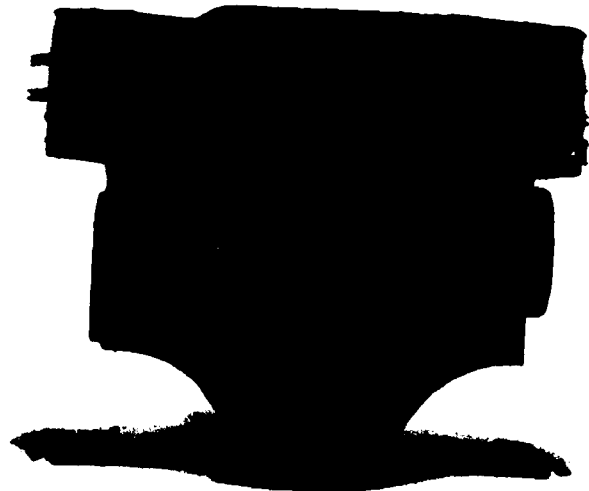
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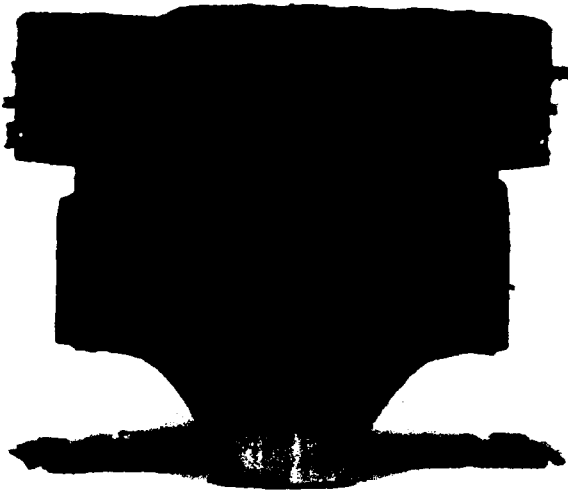


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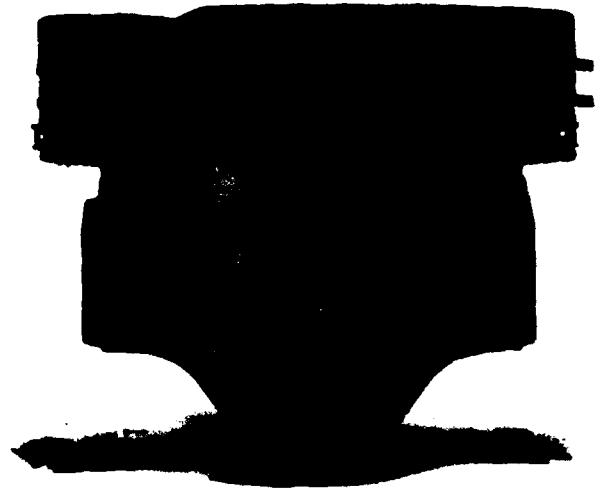


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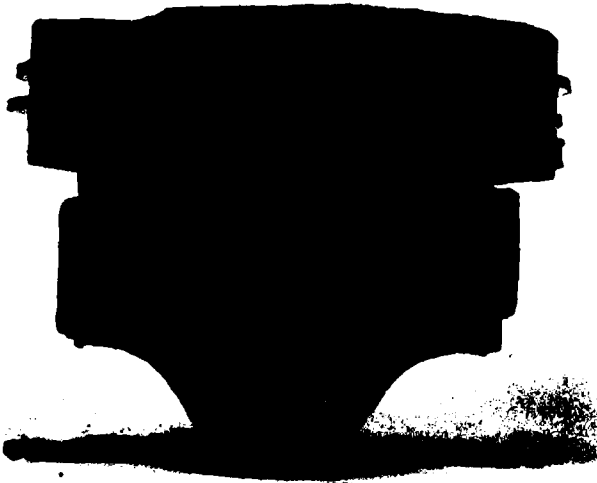
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ENGINE NO: CD7099 FUEL: GASOHOL



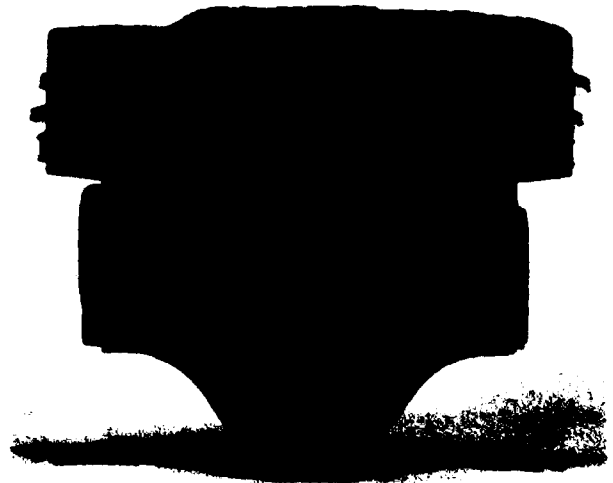
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PISTON NO. 5 ANTI-THRUST SIDE

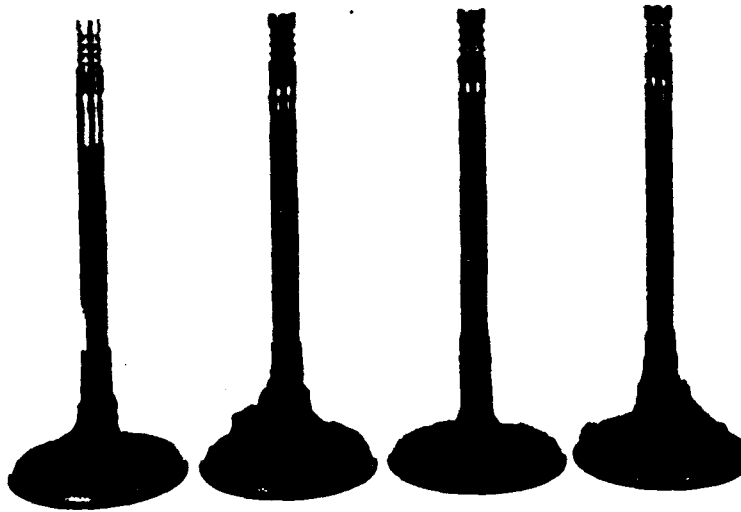


PISTON NO. 7 THRUST SIDE

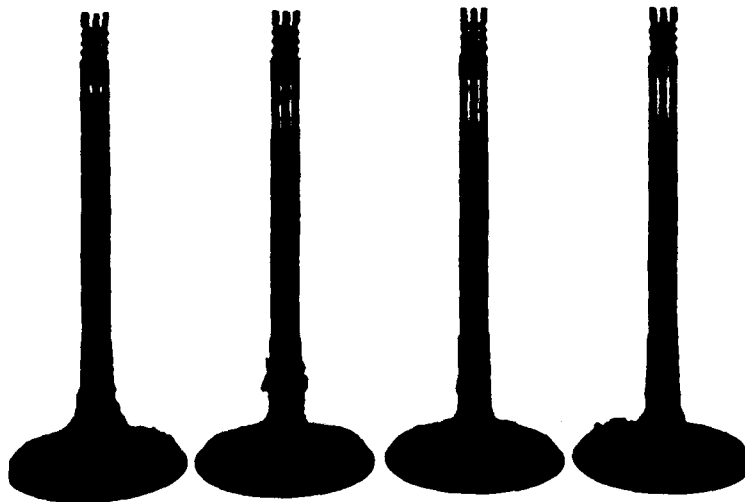


PISTON NO. 7 ANTI-THRUST SIDE

FT. McCOY, WI
ENGINE NO: CD7099 FUEL: GASOHOL

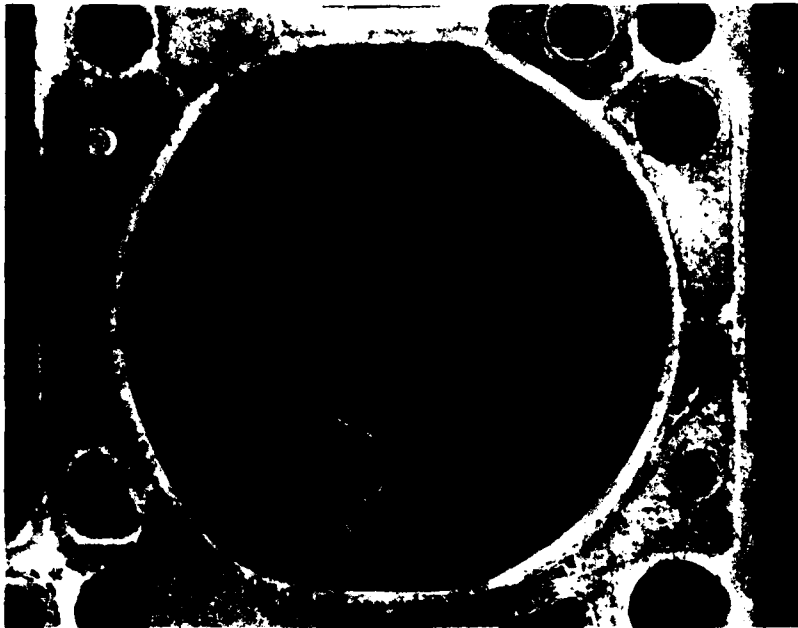


INTAKE VALVES 1-4

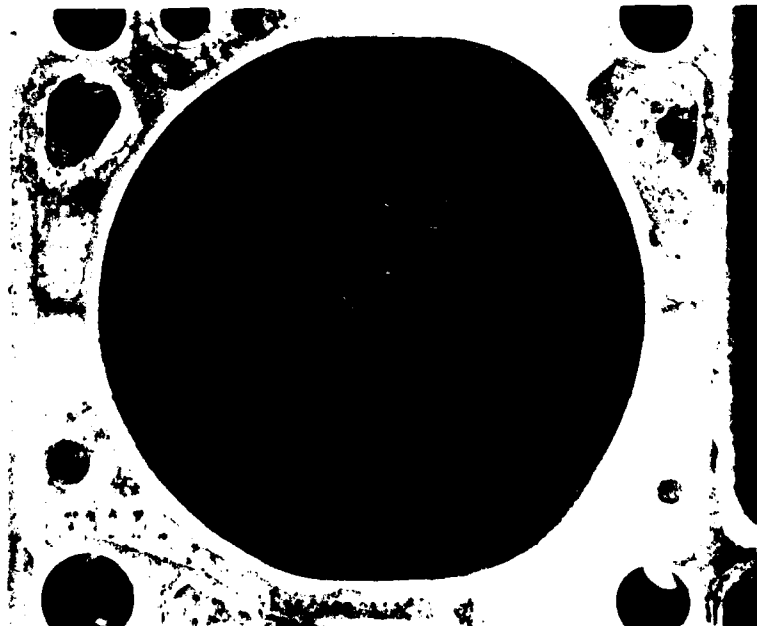


INTAKE VALVES 5-8

FT. McCOY, WI
ENGINE NO: CE7099 FUEL: GASOHOL



CYLINDER HEAD COMBUSTION CHAMBER NO. 1



CYLINDER HEAD COMBUSTION CHAMBER NO. 5

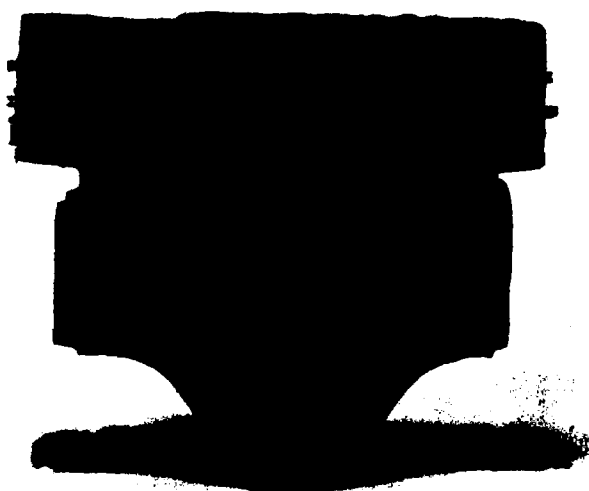
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ENGINE NO: CD7097 FUEL: GASOHOL



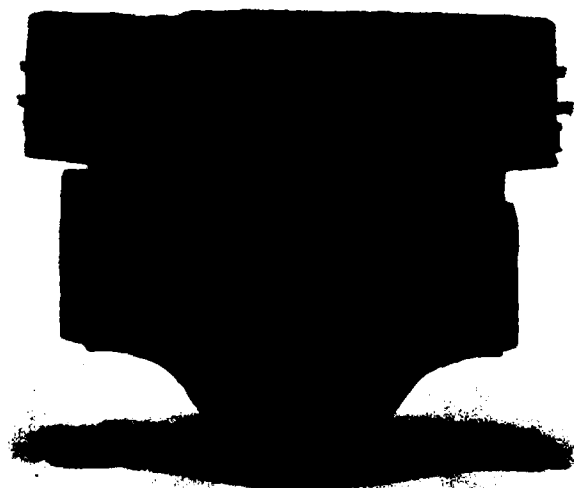
PISTON NO. 1 THRUST SIDE



PISTON NO. 1 ANTI-THRUST SIDE

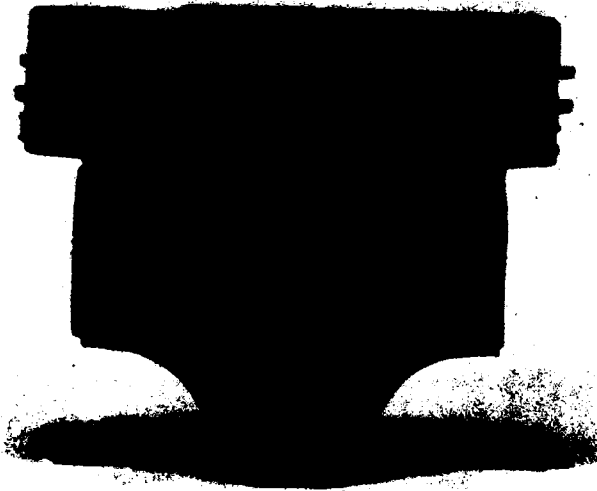


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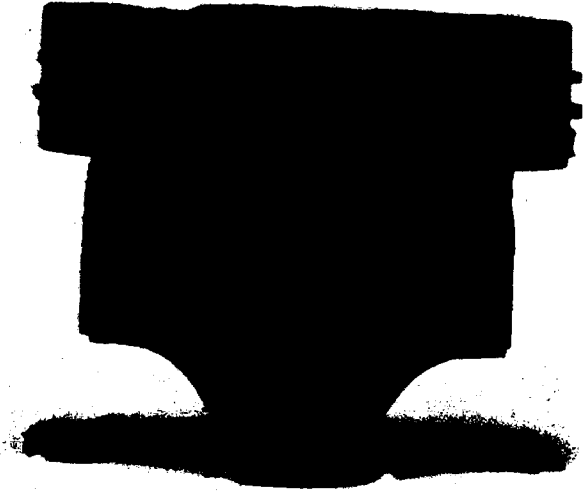


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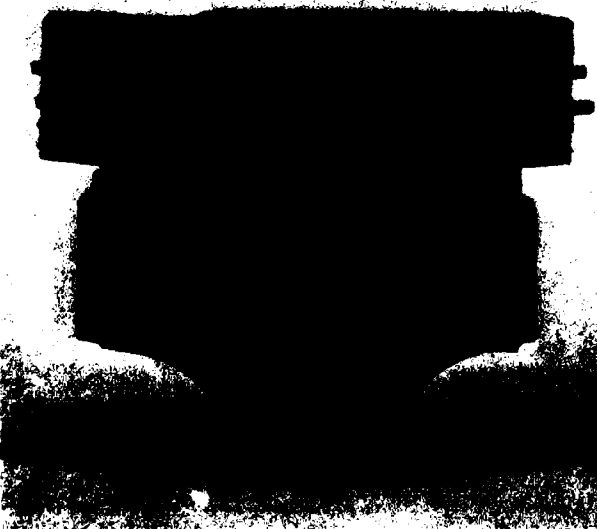
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ENGINE NO: CD7097 FUEL: GASOHOL



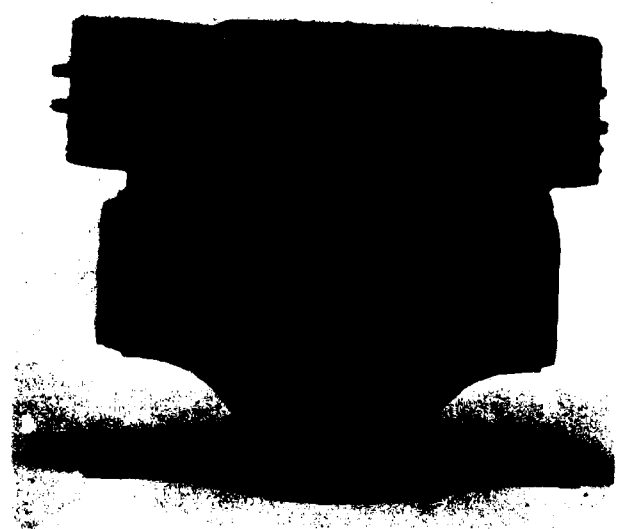
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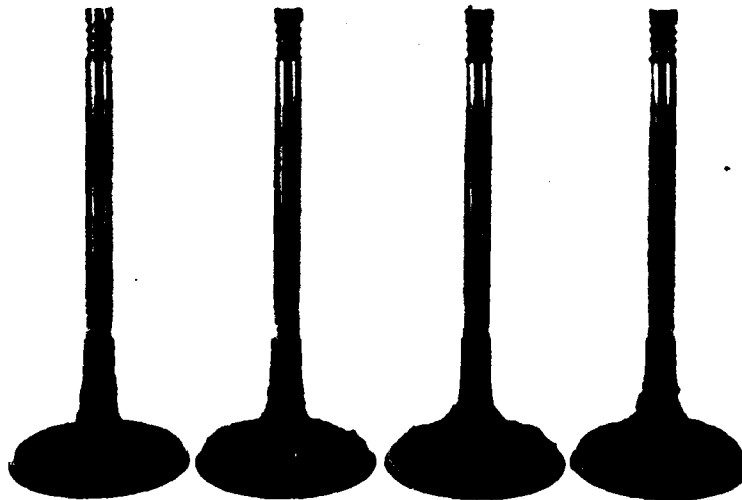


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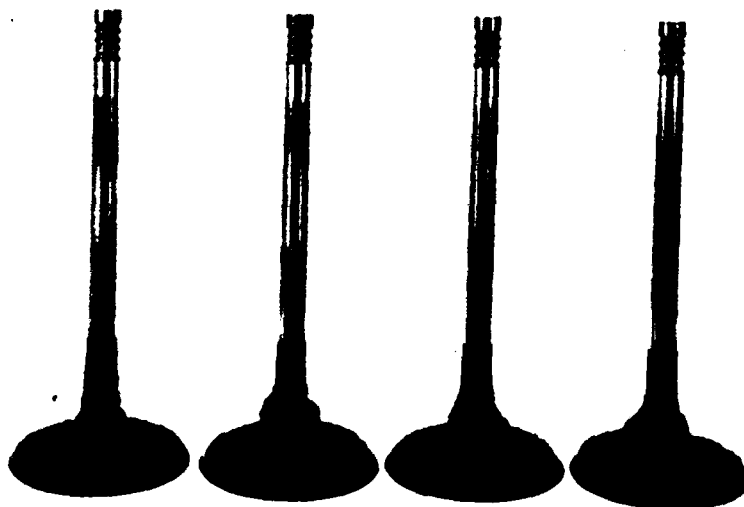


PISTON NO. 7 ANTI-THRUST SIDE

FT. McCOY, WI
ENGINE NO: CD7097 FUEL: GASOHOL



INTAKE VALVES 1-4



INTAKE VALVES 5-8

FT. McCOY, WI
ENGINE NO: CD7097 FUEL: GASOHOL

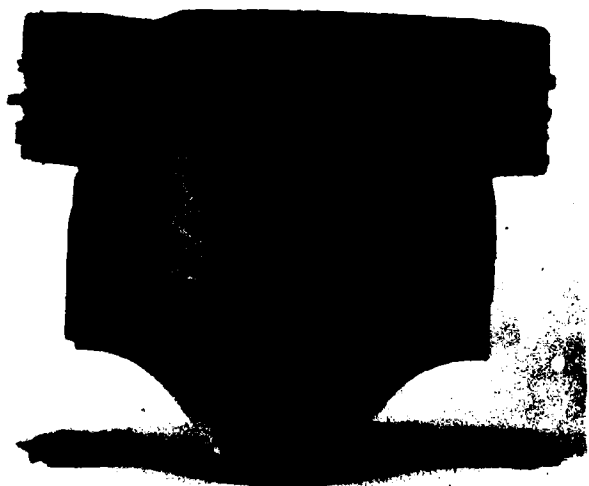


CYLINDER HEAD COMBUSTION CHAMBER NO. 1

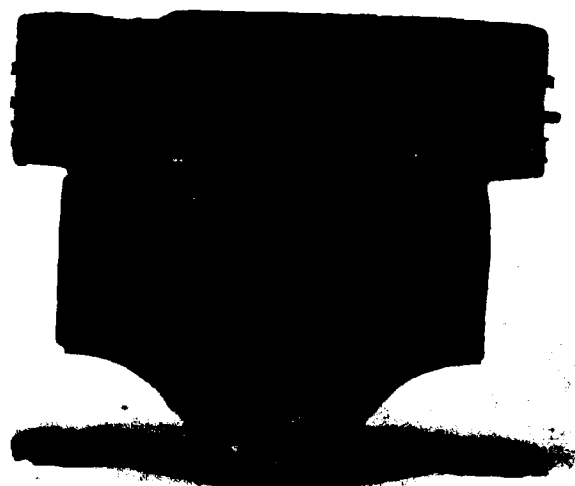


CYLINDER HEAD COMBUSTION CHAMBER NO. 5

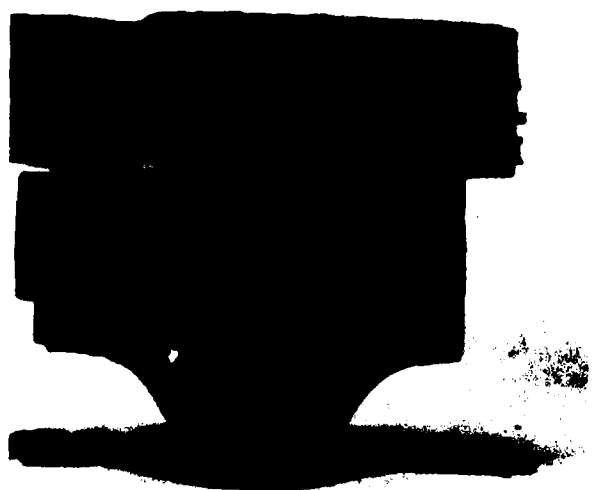
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ENGINE NO: CD7098 FUEL: GASOHOL



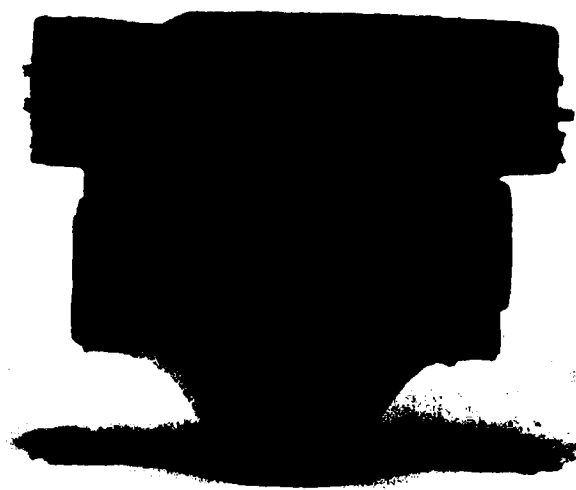
PISTON NO. 1 THRUST SIDE



PISTON NO. 1 ANTI-THRUST SIDE



PISTON NO. 3 THRUST SIDE

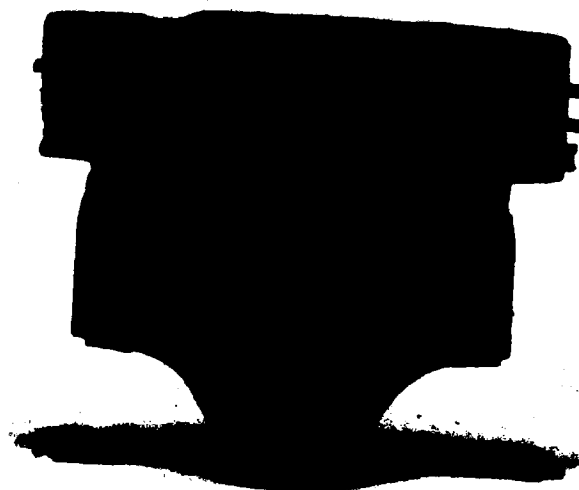


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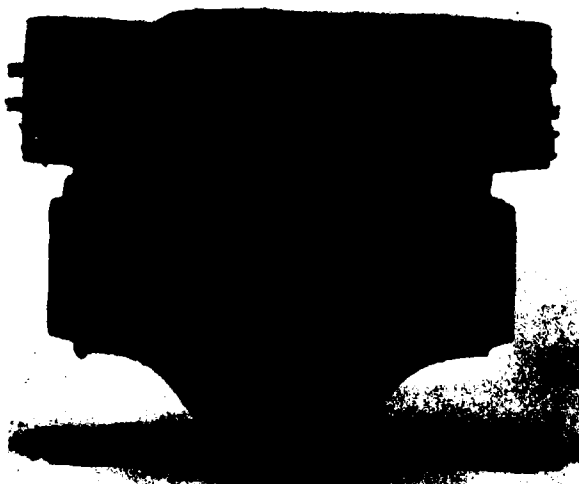
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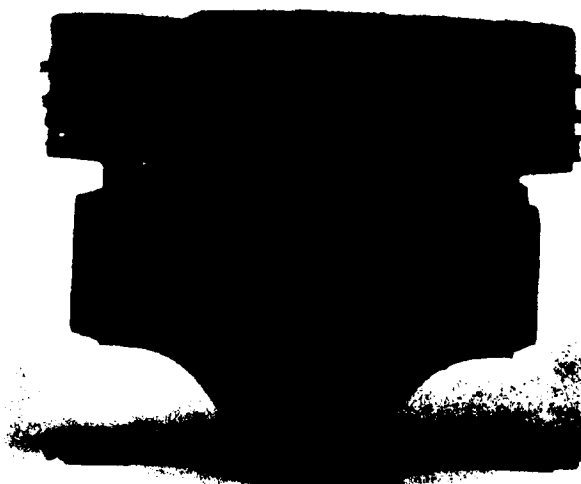
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PISTON NO. 5 ANTI-THRUST SIDE

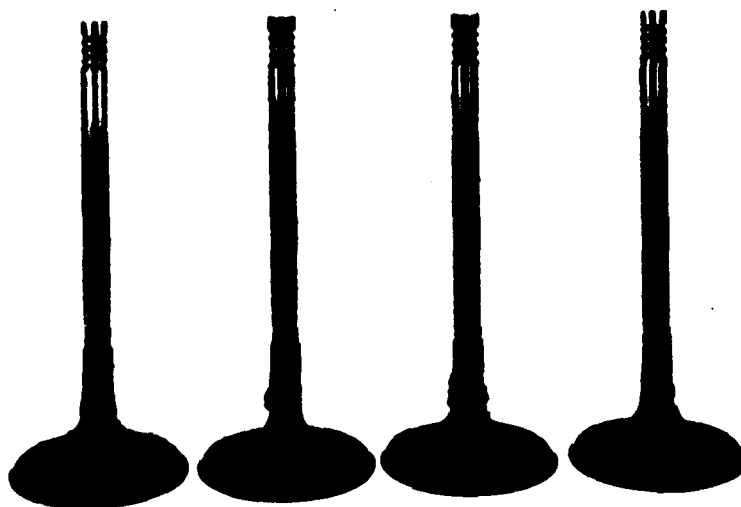


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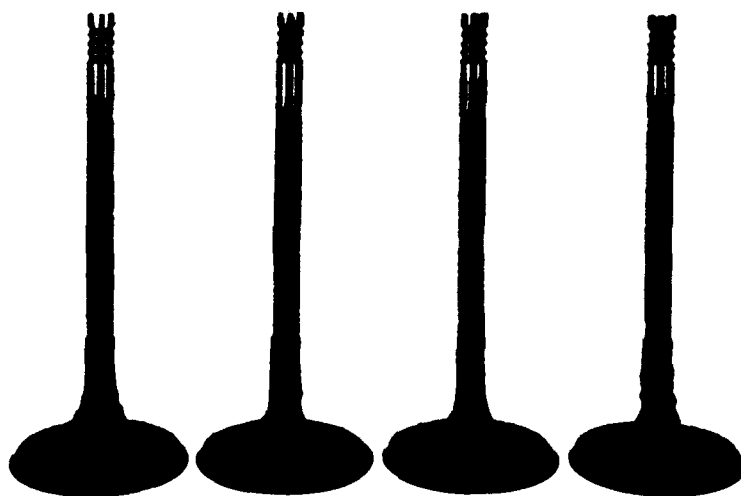


PISTON NO. 7 ANTI-THRUST SIDE

FT. McCOY, WI
ENGINE NO: CD7098 FUEL: GASOHOL



INTAKE VALVES 1-4



INTAKE VALVES 5-8

FT. McCOY, WI
ENGINE NO: CD7098 FUEL: GASOHOL



CYLINDER HEAD COMBUSTION CHAMBER NO. 1



CYLINDER HEAD COMBUSTION CHAMBER NO. 5

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